

# No. 2.—*The Butterflies of Cuba*

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## INTRODUCTION

This paper has been written with the object of providing a taxonomic analysis of the Cuban butterfly fauna, in the hope of thereby facilitating work on the many important problems connected with tropical insular biota. Studies of the Cuban fauna have been given a special significance by the establishment of the Atkins Institution of Harvard University at Central Soledad, with the resultant possibilities of coördinated and sustained observation. Because of this, the requirements of students who may be working in the Soledad laboratory have been kept in mind in preparing the keys and descriptions in this paper; much that will seem superfluous to a man working in a museum has been included, and many technical details, of interest only to the systematist, have been omitted.

At the same time, I have tried to remember the needs of lepidopterists and of general biologists interested in the problems of the origin and distribution of animal populations by including zoögeographical generalizations, as far as they seemed warranted by the material at hand. The basic units of classification have been given particular attention in this connection, as it is upon them that much of the entire structure of special biology must rest. I have tried to secure a sound and precise nomenclature with regard both to the definition of the general concepts involved, and to the applicability of the particular Latin formula used to designate any given population.

*Acknowledgements.* My greatest debt is to Prof. Thomas Barbour, who has in all ways made this paper possible. To Prof. W. M. Wheeler and to other members of the Harvard staff, to whom this paper was submitted as a thesis, I am indebted for many suggestions and criticisms. Fellow students of the Lepidoptera have been, as they always are, generous with time and with specimens, and the courtesies that they have shown me are too numerous to be itemized. Dr. Wm. Schaus, Mr. E. L. Bell, Prof. Nathan Banks, Mr. F. E. Watson and Mr. F. H. Benjamin have been especially generous, and many specific instances of their aid are cited in the pages that follow. Mr. E. T. Cresson, Jr. and Capt. R. C. Williams were very kind during my brief stay in Philadelphia, placing the excellent collections of the Academy of

Natural Sciences at my disposal. Mr. Tracy Hubbard kindly looked over the plant names used here, and suggested various changes that would bring the nomenclature into accord with current botanical usage. The field work in Cuba by Mr. Graham Fairchild and myself was made possible by a grant from the Atkins Foundation; our stay there was made pleasant by our many friends at Soledad.

*Sources of material.* The Cuban material in the Museum of Comparative Zoölogy (abbreviated in the distribution records as M.C.Z.), which forms the basis of this paper, comes largely from four collections. The first of these was made by Mr. Charles Wright, a naturalist who spent several years in the mountains near the Guantanamo basin, principally at the old cafetal "Buena Vista" in the Sierra de Yateras. He sent a great deal of insect material to the museum, including a splendid set of butterflies; they bear only the label "Cuba, Wright," but they seem in all cases to have come from the Guantanamo region, and they were probably mostly collected in 1859 or 1860. The second collection was made in the vicinity of Habana, in 1911 and 1912, by F. Cervera; it contains extensive series of the local species with good locality and seasonal data. The third collection, by far the largest in number of specimens, was made by Orazio Querci, who collected in Oriente for nearly a year in the joint employ of Capt. R. C. Williams and the late Mr. A. G. Weeks. Most of his material came from the Sierra Maestra, in the region about Santiago de Cuba. Williams (1931) has published a paper on the Hesperiidæ collected by Querci at this time. The fourth collection was made by Mr. Graham Fairchild and myself during the summer of 1932 in the Cienfuegos region of Santa Clara, especially about the Harvard laboratory and gardens and in the nearby Trinidad Mountains. The locality "Soledad" in the distribution records indicates that the species has been found in the immediate vicinity of the Harvard station.

There are many specimens from other sources in the museum collection, including material taken by various students at Soledad or by members of the staff working in Cuba, and so forth. There is a particularly interesting set of Gundlach specimens, sent to Scudder and received by the museum with the rest of the Scudder collection.

The United States National Museum (U.S.N.M.) also has a great deal of Cuban material which I was able to study. Most of their specimens were collected in Oriente and Matanzas by Dr. Schaus, the indefatigable dean of American lepidopterists. The material in the Philadelphia Academy of Natural Sciences (A.N.S.P.) and in the



Fig. 1. Outline map of Cuba.

American Museum of Natural History (A.M.N.H.) was also examined, although in a very cursory manner. The Philadelphia Academy contains the very interesting material collected by Mr. C. T. Ramsden in Oriente, some of which is not duplicated elsewhere in American collections; they also have a very important old collection made by Poey.

*Historical.* Jacob Hübner, in his "Sammlung Exotischer Schmetterlinge," issued between 1806 and 1841, was the first to figure and describe Cuban butterflies. The few West Indian butterflies mentioned by Linnaeus or Fabricius were from Jamaica or the Lesser Antilles, but Hübner figured several distinctive Cuban forms in the first volume of his work. In the text of the "Zuträge" he credited the various Cuban species there described to one Herr Frank of "Havannah." Godart, in the "Encyclopédie Methodique" (1819), described a number of West Indian butterflies, but his material seems to have come almost entirely from Hispaniola and Puerto Rico.

We do not, then, find any work especially dedicated to our fauna until 1832, when the slim volume by Poey, the "Centurie," appeared. Twenty plates, each figuring a Cuban species and each accompanied by several pages of text, were issued between April and July of that year; the work was then interrupted by Poey's return to Habana, and never resumed. Poey continued to publish, however, until 1861, as will be seen by reference to the bibliography at the end of this paper. The most important of his papers were the "Catálogo" and the "Tétiades cubanas." In the first, which appeared in short parts, all of the Cuban species known to him were listed, the undetermined ones simply as "two more species in this genus bring the total up to four," or some similar phrase. The second paper covers the Cuban species of *Eurema*, and is very well done, considering the difficulties under which the author must have labored. Gundlach quotes a saying of Poey that should be handed on: "Más vale ignorancia que error."

With this remark we come to Lucas, who prepared the part on the Lepidoptera in the "Histoire physique, politique et naturelle de l'île de Cuba." This was an ambitious attempt to catalogue the Cuban species, rendered quite useless by the fact that the Cuban collections were hopelessly mixed up with the general collection of Lefebvre. The species listed as Cuban are usually from some part of the Antilles, but many are from North, Central or South America. I have thought it best to follow the precedent of Poey and Gundlach, and ignore species listed here unless the record has been confirmed by subsequent

collecting. I have only referred to the work in the case of species described as new, or when the reference is of particular interest for some other reason. All page references are to the French edition. The new species, which are often credited to Lefebvre, or even to de la Sagra, should be credited to Lucas.

Most of the butterflies collected by Gundlach were described by Dr. Herrich-Schäffer, of Regensburg. His several papers are listed in the bibliography.

Herrich-Schäffer described the species, but Gundlach did the work. We are concerned here only with Gundlach as a lepidopterist; but it must be remembered that his work on the Lepidoptera was but one aspect of a many-sided career. He is surely to be numbered among the few great naturalists who have worked in America. His volume on the Lepidoptera of Cuba is a marvel of accuracy, and I have availed myself freely of his material in the pages that follow. It is unfortunate that students of Lepidoptera have, in general, overlooked his work; it is rare, to be sure, but so are many of the volumes to which they constantly refer. Ramsden (1915b) has written a brief biography of Gundlach that should be read by anyone interested in Cuban entomology.

The post-Gundlach period is taken up mostly with scattered descriptions of new species, most of which have been discovered by Mr. C. T. Ramsden. Holland (1916) has published a list of the Lepidoptera of the Isle of Pines, covering 65 species of butterflies. Skinner described several new HesperIIDae from Cuba, and in 1924 published a very useful list of the Cuban skippers, in collaboration with Ramsden. More recently Williams (1931) has published an interesting paper on the Cuban HesperIIDae collected by Querci.

#### NOMENCLATORIAL UNITS

*The species problem.* The basis of zoölogical nomenclature, since its inception, has been the species concept, and as two zoölogists rarely agree on a definition for species, considerable confusion has resulted. A geneticist (Goldschmidt, 1933, p. 540) may well remark: “. . . if we were to define the units which are meant if we are talking about the origin of species, the difficulties would be found insurmountable. In one taxonomic group, what is called a species is hardly distinguishable from the next species, and in another taxonomic group, the species are more different than genera in the first.” If we read in a paper on zoögeography that a certain number of species are common to two

regions, the statement means nothing unless we are familiar with the ideas of its author about species, and with the general behavior of the group of animals about which he may be writing. This is, of course, true not only of species, but of all taxonomic units, and it has led to the very general conviction that all such units are merely subjective concepts of the taxonomic mind. This "species problem" has been ably surveyed by Robson (1928) in a recent book, and from his review at least one thing is very clear: taxonomy has by no means reached the stage where it is possible to generalize about "species" as a universal category of animals and plants.

But while a general definition of the word "species" may be impossible, that by no means precludes the possibility of giving it precise meaning for a given group of animals, and it seems to me that every biologist who uses the term is under obligations to define his usage. The definitions given here, then, are intended only to apply to butterflies, and to delimit the terms used in this paper. As the fundamental unit of classification I have used the concept of a homogeneous population limited in space, considering this to be capable of the most precise definition; this concept, usually called a *subspecies*, is here termed a *choromorph*.

*Definitions.* A *choromorph*, as the term is used in this paper, may be defined as a population with common (intermingled) ancestry, whose fusion with coexisting populations is prevented by some physiological barrier, and which is separated from similar populations in other areas only by physical (geographical) barriers, partial or complete, or by mere geographical distance, and which may be distinguished from such related populations by some heritable morphological characteristic.

The term *species*, as used here, applies to two sorts of things—monochoromorphic and polychoromorphic species. The general concept may be defined as a population or group of populations separated from other similar populations by some physiological barrier, which prevents fusion, and distinguishable by some heritable morphological characteristic. The polychoromorphic species may be defined more precisely in terms of the "Rassenkreis" of Rensch (1929, p. 11) as a complex of choromorphs which have developed directly from one another, have become geographically separated, and of which at least the neighboring forms are fertile *inter se*.

*The term "choromorph."* The category here defined as a choromorph obviously differs not at all from the subspecies of most mammalogists,



ornithologists and lepidopterists, so that a justification of this change in terminology is necessary. The significance of the subspecies is due to the widely accepted theory that geographical isolation is necessary for the formation of new species, and if the term is to have any meaning, it must be restricted to this usage for geographical varieties. Its use, then, implies that it is *only* through such varieties that new species may be formed.

The fallacy of this has been pointed out by Robson (1928, p. 117 *et seq.*), who maintains that there are many effective types of isolation besides the purely geographical, and probably many other types of subspecific variation of equal evolutionary significance. In the butterflies and in certain other well known animal groups geographical isolation seems to be the only factor at present in operation, but this by no means proves the general application of the theory, and it is possible that its importance in butterflies and land vertebrates is more apparent than real. It seems to me, then, that the term *subspecies* is really misleading and liable to cause confusion when its use, throughout zoölogy, is restricted to geographical varieties to the exclusion of all others. The logical definition of the term would be more general: it might well be applied to any partially independent population considered to represent an evolutionary stage in the development of species. In this sense, choromorphs would be one kind of a subspecies.

Since *race* is an English word with a large and varied accumulation of connotations from which it can hardly be separated, and since there are similar objections to the various other terms that have been used, it has seemed best to introduce the entirely new word, *choromorph*. Rules of priority do not apply to general terms, and if this word proves undesirable or useless, it will quickly be dropped from the literature. I am indebted to Prof. Wheeler for suggesting the word, which signifies "place-form;" *choros* is used in preference to *topos*, since it is already familiar in the form of *chorology*, and if the paleontologists feel the need of the analogue, they have the convenient term *chronomorph* ready formed for them.

*Explanation of definitions.* In the study of the classification of animals, it is obvious that the individual must form the starting point. Even the concept of the individual may become hazy in some colonial animals (siphonophores, sponges, *Volvox*); but in the case of butterflies we have no difficulty in distinguishing between this specimen and that specimen from the moment that the egg is laid until final death and decay. The clearest common bond between individuals is parentage,

and so we form the family concept of parent and offspring. Large groups of families, if followed for the course of a few generations, form into a complex tangle of parent-offspring and cousin relationships, so that it is no longer possible to tell where one family ends and another begins. Such a complex of inter-related individuals is known as a *population*, and it is on this concept that we would base the classification of animals.<sup>1</sup>

The inter-relations between populations may be of all sorts and degrees of complexity, but in the phylogenetic classification of animals we are concerned only with the genetic relationships. If we study the butterflies of a given place, it soon becomes obvious that they form a number of distinct populations, genetically completely independent of one another. The barriers that separate these populations are mostly of an unknown order, but they are probably to be found in the tropistic behavior surrounding mating. That such barriers exist we know from inference: the populations maintain their identity (do not fuse) and therefore they must be separated by some barrier, presumably physiological.

In actual practise, we recognize such populations by certain morphological peculiarities of color, pattern and form. There are possibly many distinct populations in nature that we do not recognize simply because they bear no external tag that we have discovered. For the purposes of taxonomy we must have some such tag, and hence our populations, to be recognized as species, must be distinguished by some morphological characteristic—and if the tag is to be reliable and universal in the population, it must be heritable.

The physical barrier of the sea separates Cuba from Hispaniola, so that the butterfly populations of the two islands are presumably independent except in the case of populations whose members can pass freely across the barrier. Again we find it impossible to distinguish these populations unless they are marked by some morphological characteristic. We may take, then, as an example of a choromorph, population A in Cuba, separated from population A' in Hispaniola by the Windward Channel, and separated from the associated population B in Cuba by some physiological barrier—perhaps failure of the male of A to react to the smell of the female of B—and bearing a distinguishing tag by way of an extra spot on the forewing by which we can always recognize the individuals belonging to the population.

<sup>1</sup>It is impossible here to trace the very interesting history of the concept of species as populations; Kinsey (1930) has applied this system to the gall-wasp genus *Cynips*, and I am indebted to his paper for many ideas.



In continental areas the separation of associated populations A and B is on the same order; the separation of A and A', however, may not be clearly defined by any such convenient gap as the Windward Channel. The change in appearance between specimens bearing the marks of A to those bearing the marks of A' may be gradual, and it may be necessary to make an arbitrary boundary between the places where the specimens look most like A and where they look most like A'. But where constant differences have developed between specimens from two localities, there is generally at least a partial break somewhere between the two populations, otherwise the heritable morphological differences would hardly have developed to distinguish the two.<sup>1</sup> Phenotypic differences between specimens living in a moist region and those living in a dry region may show every sort of transition; but such differences do not make a choromorph, for they are not heritable. In general, it seems to me that the objections to choromorphs as taxonomic categories because of intergradation on continental areas arise either from inadequate material, from a failure to distinguish between possibly phenotypic and possibly genotypic variation, from a failure to correlate specimens and localities properly, or from a misunderstanding of the issue at stake.

The choromorph concept may thus be made fairly definite and objective. The species concept, as defined here, is admittedly largely subjective, although capable of objective test in theory. In the case of the continental choromorphs just discussed, it is fairly obvious that the existence of intermediate specimens in the border zone between A and A' indicates that if free intercourse between the two populations were possible—if there were no physical barrier—the two populations would fuse. A and A' are then clearly choromorphs of a single species, according to our definition. In the case of the island forms A and A' on Cuba and Hispaniola, we have no such criterion, and we can judge only by analogy. If the differences are of the sort that usually separate independent but coexisting populations, we must call A and A' distinct species; if the differences seem to be of a lesser order of magnitude, so that if the barrier separating Hispaniola and Cuba were removed, the two choromorphs would presumably fuse into a single form, we must consider them to represent but one species. It should be remembered that by definition two choromorphs of the same species cannot exist at the same place at the same time.

<sup>1</sup>Fisher (1930, p. 126) has proposed an interesting theory to account for the fission of a population spread over a continuous territory with gradual change in some environmental factor from one extreme of the territory to the other.

It is apparent, then, that I have stressed in these definitions the old criterion of interspecific fertility, although in a disguised form. Robson (1928, p. 77) has pointed out that all degrees of fertility exist between recognized taxonomic species, and that it is impossible to find a break in the chain between complete sterility and complete fecundity. It is undoubtedly true that associated populations vary in behavior in this respect; but it is also undoubtedly true that taxonomists vary in what they call species, and it is impossible to tell which sort of variation—that of the animals or that of the taxonomists—is covered by such a statement.

*Nomenclature.* The name formula of a butterfly used in this paper is composed of three elements—genus name, species name and choromorph name. This is in accordance with the widely accepted system of trinomial nomenclature now used in zoölogy: a system which, despite its clearness and simplicity, seems often to be misapplied by lepidopterists. For monochoromorphic species a binomial formula is used, as *Papilio devilliers*. A trinomial formula is always used in the case of polychoromorphic species in referring to any particular choromorph, as *Papilio aristodemus temenes*. The specific term is derived arbitrarily from that of the first described choromorph within the complex, and this first described form must always be designated by the complete formula, even though it involves tautology, as *Papilio aristodemus aristodemus*. The binomial, *Papilio aristodemus*, then applies to the choromorph complex as a whole.

No other classes of names are recognized in this paper. It seems to me that the Linnean nomenclature, if it is not to become hopelessly unwieldy, is best restricted to the classification of populations. The classification of individuals within the population—of seasonal forms, aberrations, dimorphic female forms, and the like—is essentially a separate problem.

*Significance of units in evolution.* In a recent article, Goldschmidt (1933, p. 542) states that "The changes necessary for the formation of a new species are so large that the relatively small differences of the subspecies as a starting point would hardly count. And I cannot help confessing that after trying to get acquainted with the taxonomist's material, the skeptical standpoint derived from my own genetic analysis could not be shaken. There is in my opinion no reliable fact known which would force us to assume that geographic variation or formation of subspecies has anything to do with speciation; the results of genetical

analysis and of sober evaluation of the other facts are positively in contradiction to such an assumption."

The taxonomic system that I have used here is based entirely on the theory that choromorphs (geographical subspecies) are the basic unit in the evolutionary series in butterflies—the starting point of population divergence. It is, then, impossible to ignore the challenge offered by Goldschmidt entirely, although at the same time it must be admitted that the data available are not of the sort that would be convincing to a geneticist; nor is this the place for a complete overhauling of the questions involved. Goldschmidt's analysis of the geographical forms of the moth, *Lymantria dispar* (Goldschmidt, Seiler & Poppelbaum, 1924), is unquestionably the most thorough study so far made of such variation in a particular species; but at the same time it seems to me of little significance as far as the general problem is concerned. The "races" of *Lymantria* occupy areas with diverse environments, and most of the racial characters that he stresses are in some way concerned with adaptations to these environmental differences. Now the vast majority of the choromorph characters used in butterflies are in no sense adaptive, and it does not seem likely that they are correlated with other, unknown, characters of adaptive significance. The genetics of geographical variation in areas of apparently identical environment must be investigated before the careful arguments elaborated by Karl Jordan (1905) can be broken down.

There are many cases of purely phenotypic changes in animal populations corresponding to changes in environment over the range of the species. No such case is known in the West Indian butterflies, and it is unlikely that such exist, as the environments of the different islands, when we consider each island as a whole, do not appreciably differ in elements that would affect the life history of a butterfly. As an example, however, we may take the North American butterfly, *Papilio glaucus*. Clark (1932, p. 184) maintains that the form described as *Papilio glaucus canadensis*, which occurs over the northern part of the species range where there is but one generation a year, corresponds to the spring form of the species in more southern localities, as in the District of Columbia. If this is true, and if the characters of the Canadian form and of the southern spring form are phenotypic, the result of temperature, then *canadensis* might be called a *pseudochoromorph*. Any arguments based on a study of this sort of a form have no force when applied to any of the West Indian cases described in this paper.

The case of *Lymantria dispar*, worked out by Goldschmidt, is

admittedly different from either that of *P. glaucus* or of any of the West Indian choromorphs, insofar as his researches show that the racial differences in *Lymantria* are genotypic, but very likely produced by a sorting out of preadaptations into the proper environmental niches. This sort of phenomenon is probably fairly common, but it can hardly be held to apply to the differences that characterize populations on Cuba, Hispaniola and Jamaica.

Goldschmidt states that "the changes necessary for the formation of new species are so large that the relatively small differences of the subspecies as a starting point would hardly count." I cannot understand this assertion, unless it is based only on his experience with the species of *Lymantria*. We find everywhere in the butterflies complete gradation between populations that are unquestionably merely *choromorphs*, and populations that are unquestionably independent and coexisting *species*; and the line between the two, as drawn in our definitions, is admittedly arbitrary and subjective in practise. Hence I have considered that the choromorph, not the species, must be used as the basic unit for study and comparison. For instance:

1. *Heliconius charithonia charithonia*. The width of the yellow bands in Cuban specimens is fairly constant; in many Hispaniolan specimens the bands are narrower. The range of variation in the two populations is somewhat different, but they are not distinguished by any fairly constant character, and so they are considered to belong to the same choromorph. Specimens from Jamaica have the bands constantly wider than those from other populations, so that a Jamaican specimen can always be recognized, although the differences are slight, and entirely superficial as far as I have been able to determine. The Jamaican population is considered to form a distinct choromorph. *II. charithonia simulator*.

2. *Colaenis julia nudeola* from Cuba has, in the male sex, two spots at the end of the cell in about 90% of the specimens; in the others there is only one such spot. The spots were not confluent in any of the specimens studied. In *C. j. haitensis* from Hispaniola, these spots merge to form a band. Specimens from Jamaica (*C. j. delila*) are almost immaculate above, with at most only a vague indication of one of the spots at the end of the cell. I have not been able to find any structural differences (genitalia) between any of these forms; in no case, however, does the range of variation in pattern in one population overlap that in another, and the three are considered to be distinct choromorphs. Similar forms of this species on the continent are much less sharply defined.

3. *Athena cleuechea cleuechea* from Cuba has, in the male sex, a well developed postdiscal line on the forewing, which is greatly reduced or absent in *A. e. pellenis* from Hispaniola; there are other slight differences in pattern, but none very noticeable. If we examine the male genitalia, we find that the outline of the clasper is different in the two choromorphs, and that there are various differences in proportion in other parts of these organs.

4. *Anartia lytrea chrysopclea* from Cuba is quite distinct from *A. l. lytrea* from Hispaniola in almost every way; yet the differences are all of degree—lighter ground color, reduced markings, larger size, and so forth. The two were early described as “species;” yet here they are listed as choromorphs of the same species, largely because the structural differences (in the genitalia) are slight, and concerned with proportion only, and because the two forms are obviously close in all respects, and together quite distinct from any of the other species of the genus. They might, however, almost equally well be regarded as “species;” only by bringing the two forms together in the laboratory for experimental breeding could their status be settled with any certainty.

5. The case of *Lucinia sida* and *L. cadma* is almost exactly like that of *Anartia lytrea*, but these two forms are somewhat more distinct structurally, and they have been given “specific rank” in this paper.

6. From this we pass to examples like the West Indian forms of *Dismorphia*, *Hymenitis* and *Calisto*, where each island is inhabited by a distinct form, comparable in all respects to the ordinary species of taxonomists. In some cases, where closely related species inhabit the same area, as *Papilio pelaus atkinsi* and *Papilio oxynius*, or *Papilio cresphontes* and *Papilio thoas oviedo* in Cuba, we may conjecture that the original distribution of choromorphs has become disturbed, and the extreme forms have come again to live side by side, each sufficiently distinct to maintain its identity as a separate population.

7. One of the most interesting cases of this sort is furnished by the American forms of *Precis*. Cuba is inhabited by two forms that are apparently quite independent—“good species.” The one form is like that found in the United States (*P. coenia*); the other is found in Cuba, Hispaniola, Jamaica and northern South America (*P. zonalis*). The two are apparently connected by intermediate forms in Central America. The material available has proved inadequate for a thorough study of this group, as the range of individual and seasonal variation is large, but it is difficult to avoid the inference that extreme forms have become differentiated on the continent and have reached Cuba from



the north and from the south, sufficiently distinct to maintain their identity there as separate populations.

Where is the break in this chain between the "relatively small differences between subspecies" and the "large changes necessary for the formation of new species?"

In a way, island choromorphs are probably not particularly suited to the study of problems related to evolution, since it seems likely that most of the significant development of species takes place on continental areas. It is well known that island faunas are apt to be conservative, perhaps because once isolation has taken place, there is little chance for the isolated populations to come again into contact, with a consequent multiplication of the number of coexisting species.

Again, we know nothing at all of the drive behind evolutionary change. Perhaps this drive is not as powerful in small isolated island communities as it is on continental areas, where the "struggle for existence," the "survival of the fittest" and so forth may be more effective. It is certain, from the geological evidence, that some species have remained unchanged, at least as far as perceptible characters are concerned, for long periods of time, while others have undergone considerable modification. The explanation of this, however, need not involve directly the concept of the choromorph. It seems to me very clear that geographical isolation *permits*, but by no means *causes* the development of new forms. Taxonomists and paleontologists have for the most part become thoroughly permeated with Lamarckian ideas, so that it is no wonder that the geneticists are apt to regard all taxonomy as "queer." Goldschmidt starts the article to which I referred above (1933, p. 540) with a quotation from Osborn which thoroughly mixes some kind of a mystical orthogenesis with the concept of subspeciation, and both Goldschmidt and Osborn seem to have considered the mysticism and the subspeciation to be inextricably united. If we are ever to reach the stage where it is possible to discover the underlying principles of animal evolution, we shall each have to learn how to sort out the facts from the speculations in the work of our colleagues. And while it is undoubtedly true that the taxonomist has a very great deal to learn from the geneticist, it is also true that the geneticist will probably find much of interest and of use to him in the accumulated experience of those who have for so long been patiently pigeon-holing all the different "kinds" of animals they can find.

*References.* I have attempted here only to justify the nomenclatorial system that has been used in this paper. The literature on geographical

variation is becoming enormous, and it has been ably reviewed by several recent authors. The most thorough summaries of the evidence offered by Lepidoptera will be found in Rothschild and Jordan (1903, pp. xxvi-xliv) and in the article by Karl Jordan (1905). The paper by David Starr Jordan (1905) is interesting because of the wide currency of "Jordan's Law" to the effect that related species occur always in neighboring but distinct regions; the application of the law, of course, depends on the definition of species. The recent books by Kleinschmidt (1926) and Rensch (1929) contain interesting reviews of the evidence from a wide variety of sources; Rensch includes a useful bibliography, as does Robson (1928). Pearse (1934) has published a suggestive review of factors related to ecological segregation, which reminds us again that isolation, to be effective, need not always be geographical.

#### GEOGRAPHY

The American land mass, from the geographical point of view, can be conveniently considered as composed of three major areas, North, Middle and South America. The Middle American region is in many respects a more or less indefinite transition zone, including the heterogeneous elements of Mexico, Central America, Panama and the Antilles. These political units, with slight alterations, serve very well for biological purposes. Mexico is distinct largely because of its amazing mixture of tropical and temperate climate and biota. If we add Chiapas and the neighboring areas to the political Central America (Guatemala, Salvador, Honduras, Nicaragua, Costa Rica), and if we ignore the temperate elements found on the Guatemalan plateau, we have a fairly definite faunal area, merging with the Sonoran in Mexico and with the more typical South American in Panama. The Antilles sprawl out between these continental divisions, overlapping Florida on the north, separated from Yucatan on the west by about 200 kilometers, and reaching to within 125 kilometers of South American faunal areas (Grenada to Tobago and Trinidad) in the south.

The Antillean archipelago comprises an amazing number of islands, islets, rocks and reefs, logically divisible into three groups—the Bahamas, the Greater Antilles and the Lesser Antilles. We are here concerned almost entirely with the Greater Antilles, including Puerto Rico (area about 8,900 sq. km., maximum elevation about 1,100 meters), Jamaica (area 11,500 sq. km., max. elev. 2,200 m.), Hispaniola, composed of the two republics of Haiti and Santo Domingo (area, 76,500 sq. km., max. elev. 3,200 m.) and Cuba, which we shall con-

sider in greater detail. Perhaps the best geographical account of the West Indian region as a whole known to me is that of Hill (1898); the various accounts in Shelford (1926) will also be found to be useful, but most of the recent guide books and so forth prove disappointing to the biologist.

Cuba is the largest of the Antilles, with a total area of about 112,000 square kilometers, a total length of about 1200 km., and a breadth that varies between about 40 and 200 km. It is about 210 km. from the nearest point in Yucatan, about 150 km. from Key West, Florida, some 77 km. from Hispaniola, about 80 km. from the nearest of the Bahamas (Great Inagua) and some 160 km. from Jamaica. It is just south of the Tropic of Cancer, and extends roughly between 19° 48' and 23° 3' North Latitude and between 74° 7' and 84° 57' West Longitude. The topography is varied, including almost all of the possible tropical habitat types except the extreme xerophytic; the greatest altitude is probably that of Pico Turquino, 1,950 meters.

The distribution of the various butterfly species in Cuba has been summarized by provinces, as the material available does not warrant any finer analysis. The general plan of the six Cuban provinces is indicated on the accompanying outline map (figure 1). Pinar del Rio, the westernmost province, has an area of 12,991 sq. km.; it includes the *Cordillera de Guaniguanico*, or the Organos Mountains, which reach a maximum elevation of 760 meters. This is the least known part of Cuba, as far as the butterflies are concerned, and it will probably yield several additional species.

The next province is that of Habana. The Isle of Pines is politically a part of Habana, but it has been kept separate, for obvious reasons, in summarizing distribution. The area of Habana province is 10,425 sq. km., of which 2,126 sq. km. go to make up the Isle of Pines, and 105 sq. km. various outlying *cayos*. No butterfly collecting seems to have been done on any of these Cuban *cayos*, so they have been left entirely out of consideration in the preparation of this paper. Habana province includes several ranges of low hills, but no distinctive mountain areas. Several butterfly species, however, are known only from this section (*Papilio polyxenes*, *Zerene cesonia*).

Matanzas (8,479 sq. km.) is very similar to Habana.

Santa Clara (20,911 sq. km.) includes the Trinidad Mountains and the Zapata swamp as topographic features of particular biological interest. The Trinidad Mountains reach a maximum elevation of about 950 meters, and various butterflies that occur there are found elsewhere only in the mountains of Pinar del Rio and Oriente. Curi-



ously some of the species found both in Pinar del Rio and Oriente (*Hymenitis*, *Dismorphia*) have not yet been found in these central mountains. Apparently no butterflies have been collected in the Zapata swamp since the days of Gundlach; several peculiar birds are found there, but it would not be so apt to have distinctive butterflies.

Camagüey (24,145 sq. km.) is mostly a great plain, given over to sugar cultivation. Little collecting has been done there and there is no reason to expect any peculiar forms.

Oriente (34,878 sq. km.) is the largest of the provinces, the most varied, with the Sierra Maestra reaching a maximum elevation of about 2,000 meters, and the richest zoologically. Many species are known only from this part of Cuba, and some of these (*Papilio gundlachianus*) seem to be relict forms, not closely related to any other known butterflies. The region is fairly well known because of the activity of various collectors at Santiago de Cuba and Guantanamo, and because visiting entomologists have usually spent a good part of their time there.

Those desiring a more detailed account of the local geography will do well to consult the text used in the Cuban schools (Aguayo and de la Torre, 1928). The physical features of the island, as far as they are related to the fauna, are admirably treated by Barbour (1923) in the introduction to his "Birds of Cuba;" and Brother Leon has written a brief ecological account of the island in Shelford (1926, pp. 682-694).

#### GEOLOGY

The accounts of the geological history of the Antilles given by various authors are exceedingly diverse and often flatly contradictory, so that it is difficult to piece together a coherent or authoritative account. It is especially difficult to sort out statements in the literature based on geological evidence from those based on recent zoogeographic evidence. The paleogeographer makes a land bridge because he thinks the present animal distribution requires it, and we then take the land bridge as a geological construction, trying to explain the present fauna on that basis—no progress can be made by such circular methods. The Antilles seem indeed to have been a happy hunting ground for the land bridge architects, and one of the best known of these, Guppy (1909, p. 391), can casually make a statement like this: "It is, I think, pretty clearly made out that there was in tertiary times a land connexion between the Caribbean and North Africa. . . ." There seems to be little middle ground between this sort of thing, and the papers of the more

prosaic geologists, who go about their business of making stratigraphic descriptions of the region, without any mention of the possible presence or absence of this or that land connection.

It is fortunate that butterflies have wings, and can often fly for considerable distances, at least with favorable winds, so that we are by no means dependent on land bridge constructions. It is difficult to deny the zoölogical evidence for former continental connection with Cuba; yet if there has been any such connection recently, it seems quite impossible to explain the present poverty of the fauna, and the complete absence of many important groups. Students interested in pursuing this question further will do well to consult the well known paper by Matthew (1915) and Barbour's review (1916). It seems to me that the Miocene submergence of Cuba (Lewis, 1932) offers an excellent way out of the land-bridge dilemma. One can have all the connections needed in pre-Miocene times, and then have any excess population killed off in Miocene, with enough things surviving on the mountain tops to repopulate the country.

Barbour (1923, pp. 9-13) has reviewed the early work of Hill, Vaughan and others on the geology of the region, summarizing the results in a table. Recent work on index fossils in the various Cuban formations has somewhat altered the sequence given there; a paper by Lewis (1932) summarizes the present geological information, and includes a bibliography of recent special papers. Schuchert (1929) has written a very interesting summary of the geological history of the Antillean region, with many maps; but it is unfortunately impossible to sort out the geological from the zoögeographical evidence in his paper.

We are here interested only in the events of Tertiary times, as modern butterfly types are probably not much older than that.<sup>1</sup> Schuchert (1929), states that "apparently all of the Greater Antilles with the exception of western Jamaica were emergent during early Eocene time . . . in Upper Eocene the Greater Antilles were more or less inundated." On his map (fig. 6, *l.c.*), he shows a Honduras-Cuba land connection for Upper Eocene. Lewis (1932, p. 541) mentions several Eocene formations in Cuba.

Barbour and Schuchert both consider the Oligocene to have been a period of widespread submergence in the Antillean region; this supposition, however, seems to be based largely on the Yumeri and similar limestones which, on the basis of foraminifera determinations, are now dated from the Miocene. Thus one may perhaps assume that the Oligocene submergence was not as extensive as has been hitherto

<sup>1</sup>Forbes (1932) has given an account of the possible age of the Lepidoptera.

supposed. Lewis (1932, p. 541) states that "overlying the Eocene in several localities are limestones which are very similar to the members just described [Eocene], but which contain foraminifers that are diagnostic of the Oligocene. These can be differentiated only by the most painstaking micropaleontology."

The Miocene, according to the older accounts, was a period of emergence. Lewis, however, (1932, p. 550) states that "during the Miocene the entire island, with the exception of the Organos Mountains, the Trinidad Mountains, the Sierra Nipe, the Sierra Maestra, and a few isolated peaks along the axis of the island, was submerged and reef limestone, marls, and limestone conglomerate, reaching, in some places, a thickness of 1,700 feet, were deposited, overlapping the slightly folded and eroded older formations."

The island is presumed to have emerged approximately to its present position at about the end of the Miocene, and during the Pliocene and Pleistocene to have undergone only minor oscillations, of little interest to us here. It is noteworthy, however, that Lewis dates the mountains of Oriente from Pleistocene, stating that they appear to be among the youngest and best defined fault-block mountains of the world. "In fact, many of the fault scarps in this region are of such recent origin that no appreciable talus has formed."

#### THE ANTILLEAN BUTTERFLY FAUNA

Kaye (1926 and 1931) has published a list of the butterflies of Jamaica, where he found 106 species. Hall (1925) has written a similar list for Hispaniola, enumerating 139 species; while the last published list for Puerto Rico (Wolcott, 1924) lists 106 species. If we add these lists to the present enumeration of the Cuban butterflies, we get a fair picture of the Antillean fauna. The Jamaican, Cuban and Puerto Rican lists are probably about equally complete; only the Hispaniolan fauna is comparatively inadequately known.

*Poverty of fauna.* It appears at once that the West Indian butterfly fauna is very limited. We should expect two or three times this number of species in large and varied tropical islands. Kaye (1904) listed 289 species from the small island of Trinidad (about 5,000 sq. km. in area), a list that is by no means complete; and we should find two or three times the number of species known from Cuba in an area of comparable size and diversity on the Central American mainland.<sup>1</sup>

<sup>1</sup>Godman and Salvin, in the *Biologia Centrali-Americana*, list 1805 species of butterflies from Central America.

It is very difficult to get accurate data for faunal comparisons in insects, but this poverty of species seems to hold true for other groups in the West Indies, with some striking exceptions—the Cuban Sphingid fauna, for instance, is well developed, with some 60 species represented

*Antillean Fauna*

	Cuba	Hispaniola	Jamaica	Central Am.	South Am.	North Am.		Cuba	Hispaniola	Jamaica	Central Am.	South Am.	North Am.
1. Pieris	x	x	x	x	x	x	24. Vanessa	x	x	x	x	x	x
2. Appias	x	x	x	x	x		25. Hypanartia	x	x	x	x	x	
3. Melete	x	x		x	x		26. Precis	x	x	x	x	x	x
4. Eurema	x	x	x	x	x	x	27. Anartia	x	x	x	x	x	
5. Phoebis	x	x	x	x	x	x	28. Metamorpha	x	x	x	x	x	
6. Anteos	x	x	x	x	x		29. Athena	x	x	x	x	x	
7. Kricogonia	x	x	x	x			30. Hypolimnas	x	?	x		x	
8. Zerene	x	x	x	x	x	x	31. Historis	x	x	x	x	x	
9. Nathalis	x	x	x	x	x	x	32. Coea	x	x	x	x	x	
10. Dismorphia	x	x		x	x		33. Colobura	x	x	x	x	x	
11. Danaus	x	x	x	x	x	x	34. Lucinia	x	x	x			
12. Lycorea	x	x		x	x		35. Eunice	x	x	x	x	x	
13. Anelia	x	x	x	x			36. Dynamine	x	x	x	x	x	
14. Hymenitis	x	x	x	x	x		37. Cystineura		x	x	x	x	
15. Calisto	x	x	x				38. Didonis		x		x	x	
16. Heliconius	x	x	x	x	x		39. Ageronia		x	x	x	x	
17. Eueides	x	x		x	x		40. Myseelia		x		x	x	
18. Metamandana		x		x	x		41. Adelpha	x	x	x	x	x	
19. Colaenis	x	x	x	x			42. Doxocopa	x	x	x	x	x	
20. Dione	x	x	x	x	x	x	43. Asterocampa	x			x		x
21. Euptoieta	x	x	x	x	x	x	44. Prepona	x	x		x	x	
22. Phyciodes	x	x	x	x	x	x	45. Siderone	x	x		x	x	
23. Chlosyne	x	?	x	x	x		46. Anaea	x	x	x	x	x	x

Distribution of Antillean Genera of  
Pieridae, Danaidae, Nymphalidae

there. It is interesting to note that the mollusc fauna of Cuba is very rich; but Mr. Clench tells me that this fauna may have arisen locally from a comparatively few types.

*Distribution of genera.* The accompanying table shows the distribution of the genera of butterflies in the Greater Antilles. The Hesperidae have been omitted, as it is difficult to correlate the generic

names under which the species from different islands have been listed; their distribution seems to be similar to that shown by the other families, however; there are no peculiar Antillean genera. The Papilionidae and Lycaenidae have also been omitted, since the genera in these families are purely artificial groups, their distribution of no significance.

In the first place, it appears that almost all of the genera are widespread, and that only two (*Calisto* and *Lucinia*) are confined to the West Indies. Of the 46 genera listed, only 13 extend into the United States north of Florida; and of these 13, all except one are also found in South America. The exception (*Astrocampa*) is a rather doubtful Nearctic genus that should probably be united with the Old World *Apatura*. The affinities of the fauna, then, are unquestionably Neotropical. It is curious that no South American genus not also found in Central America is represented, although the reverse is not true. Some of the individual species, however, are closer to South American than to Central American forms.<sup>1</sup>

Of the two genera known only from the Antilles, *Lucinia* is very close in structure to the widespread Neotropical *Eunica*, while *Calisto* forms a markedly distinct Antillean group, which Forbes (1930, p. 9) considers to be most closely related to certain Chilean forms. *Lucinia* is represented by forms on each of the islands sufficiently similar in appearance and structure to be possibly considered as merely chormorphs of a single species. *Calisto*, on the other hand, includes one species from the Bahamas and Cuba, three from Hispaniola, one from Puerto Rico and one from Jamaica. The species are quite distinct in appearance, and extraordinarily so in structure. Genitalia slides were made of most of the forms, in the hope of showing the interspecific relationships, and these organs were found to be as diverse in the different species as is usually the case with genera. From this it would appear that the group may be a very ancient one, the species long isolated and stable.

*Absence of certain groups.* If we compare this list of West Indian genera with a similar list from any other part of tropical America, we notice a number of striking omissions. There is only one Ithomiid genus, *Hymenitis*, with only one form on each island; there is only one Satyrid genus, *Calisto*; there are no Morphids, no Brassolids, and

<sup>1</sup>An apparent exception to many of these statements, *Hypolimnas*, is an African genus of which only a few American specimens are known, so that no significance can be attached to its distribution. It is generally supposed to have been introduced at the time of the slave trade.

only one little known Riodinid. Yet all of these are large and well developed groups everywhere else in tropical America. In the moths, one other case may well be considered at the same time: the region, although rich in Sphingids, has not a single Saturniid.<sup>1</sup>

This situation has been commented on by almost everyone who has written on the distribution of West Indian insects, but usually no explanation is attempted (see Forbes, 1930, p. 8; Kaye, 1926, p. 455). To me, all of the evidence points plainly to the Antillean fauna's consisting of a nucleus of very old types supplemented by many recent (post-Miocene ?) adventitious arrivals. It may be worthwhile to examine this hypothesis in some detail.

The groups that are absent or scarcely represented in the fauna—Ithomiids, Satyrids, Morphids, Brassolids, Riodinids, Saturniids—are all weak or local flyers. At first glance this statement seems obviously false. Kaye (1926, p. 456) states definitely: "Feeble flight alone cannot account for the absence of these forms, as in spite of the hurricanes weak-flying *Terias* [*Eurema*] are to be found commonly." Forbes (1930, p. 8) says of the Saturniidae, "they are strong flyers." No one who has sadly watched a *Morpho* sail out of reach would deny the marvelous ability of that genus in flying, and the Castniids, also absent from these islands, are among the most violent of all Lepidoptera on the wing. On the other hand the *Euremas* which, as Kaye points are abundant on all of the islands, flop about over the grass in a very lackadaisical manner. To lump all of the missing groups as weak or local flyers and all groups present as strong flyers, seems at first certainly nonsense.

Yet, if we examine the picture carefully for details, it changes somewhat. No one will deny that the Ithomiids are weak flyers, usually confined to the shade of the deep forests. The Satyrids are also feeble flyers, although some species are capable of astonishing spurts of speed when chased. The *Morphos* are large, broad-winged butterflies that soar easily through the forest, tireless and powerful. But they are essentially forest insects, probably never straying far, and very unlikely to go wandering out to sea. Many of the forms are quite local, in strong contrast to the wide dispersal of apparently weaker flyers like *Vanessa* and *Euptoicta*. Furthermore, the *Morphos* are essentially South American insects, with comparatively few forms in Central America,

<sup>1</sup>A Hemileucid moth described by Walker as *Lasiocampa plana* has recently been rediscovered in the high mountains of Haiti; it has not yet been critically studied.



so that it is possible that the Antillean environment is not suited to them.

The Brassolids are again large and apparently powerful insects, and unlike the *Morphos*, they are common in Central America. Their food-plants—palms and the like—are abundant in the West Indies. But again, the Brassolids are local, forest loving butterflies. The *Caligos* in particular are very sedentary, and while the *Opsiphanes* species are exceedingly vigorous, their flights seem to be local. No Brassolids are known to migrate.<sup>1</sup>

The Riodinids are, like the Satyrids, generally admitted to be weak flyers. The species are, as a rule, even more local than the Satyrid forms. None is known to migrate.

The Saturniids, while not "butterflies," should be considered here, as they are the group that Forbes seems to have thought to wreck the feeble and local flying theory. I do not see this at all. They are large insects, to be sure, and it is known that males will fly considerable distances to reach a female, battering vigorously against a cage in which a female is confined. But such an incentive is lacking in the case of a sea voyage to Cuba. The females of Saturniidae have atrophied mouth parts, take no food as adults, and die within a few days. They are heavy bodied and apt to be sedentary. None of the insects usually reported on shipboard 200 miles at sea belongs to this family.

Forbes emphasizes the fact that the family is well developed in tropical America. He says: "They are an ancient group which must have existed in South America for an enormous length of time, as a whole group of primitive genera (*Automeris*, *Dirphia*, etc.) are dominant there. Also South America contains the annectant Oxytenidae and Cercophanidae, suggesting that the whole family may have arisen in that continent." Unfortunately, I am in no way prepared to discuss primitive versus specialized groups in the Lepidoptera; but accepting these statements as facts, it seems to me quite possible that not very long ago—say at the beginning of Cenozoic time—there were not any Saturniids in South America. In fact, the abundance of primitive forms there might equally well be used as an argument for the comparatively recent arrival of the group. When we remember the great shifts in

<sup>1</sup>The data on migration used here are taken from C. B. Williams (1930). The presence of an occasional specimen of one species in a migrating horde of another species is no proof of wandering habits, as from my own observations I believe that almost any butterfly is liable to join a migration for a short distance, then drop out. The behavior of these hangers-on would make a very interesting study.

distribution known to have occurred in mammals, we become skeptical about any evidence that seems to keep insect groups in place for any great length of geological time. There are, in fact, a number of points about the distribution of Saturniid genera—sometimes utilized by intercontinental land-bridge architects—that would make an interesting study from the point of view developed by Matthew (1915), but such speculations are completely foreign to our present topic. I think it is clear, first, that the Saturniidae are not powerful flyers, in the sense that the Sphingidae are, and second, that arguments based on the present distribution of primitive genera must be viewed with caution.

The other side of the question remains to be examined—the presence of so-called weak flyers on the Antilles. Kaye (1926) seems to stress the great development of *Eurema*. While a *Eurema* flying about the grass seems as feeble as any Satyrid, we have the evidence to the contrary offered by its well known habit of migrating. C. B. Williams (1930, p. 131) refers to various instances of great swarms of *E. lisa* appearing off Bermuda. Surely this is not a sign of weak flight! The skippers, well represented in the West Indies, might seem to have the same sort of flight as many Riodinids. Many skippers are wide ranging, however, some species extending from Canada to the Argentine with no apparent variation; various instances of migration of species in the group are known. *Calisto* and some other weak-flying genera may be comparatively ancient inhabitants of the region, left over from a time when access was easier.

I am well aware that there are many exceptions to the arguments that I have given above, but these exceptions seem to me of comparatively little weight when compared with the striking general occurrence of wide ranging, strong flying butterfly groups in the West Indies, and the absence of butterflies belonging to groups characterized by weak flying, non-migrating and local habit. It might be well to point out some of the exceptions—the occurrence of *Apodemia carteri*, a Riodinid, in the Bahamas and Cuba; the presence of *Rothschildia*, a Saturniid genus, on Martinique; the presence on all islands of Syntomidae, a family apparently as local and weak in flight as the Riodinidae, and so forth. It would obviously require some straining of the imagination to explain away each and every exception of this sort, and it seems to me unnecessary even to try. We do not know enough about the habits of the various species involved to consider individual cases in any detail. Perhaps we do not know enough about the general habits of butterflies even to postulate as much about the different groups as



I have done. The subject is a very interesting one, however, and surely worthy of more detailed consideration than it has been possible to give it here.

*Homogeneity of fauna.* That the fauna is homogeneous is indicated on our generic table, which shows that thirty-four of the forty-six genera there listed are found on all three islands. Of the twelve not so distributed, seven are found in Cuba and Hispaniola, but not in Jamaica; two are found in Hispaniola and Jamaica but not in Cuba, while three are limited to Hispaniola. None is limited to Cuba or to Jamaica.

The seven genera found in Cuba and Hispaniola but not Jamaica are all very large, very widespread Neotropical genera, in each case represented by only one species on each island, although in two cases the Hispaniolan and Cuban forms may be called distinct species, in three cases distinct choromorphs, and in the remaining cases the Antillean choromorph is distinct from any continental form. In short, in none of these seven cases is the Antillean form identical with the continental form. That would seem to indicate that the island populations were at the present time effectively isolated from their continental relatives, and that the original colonization either dated from the time when the islands had continental connections, or were accidents of the sort not easily nor often repeated. The two genera limited to Jamaica and Hispaniola are also widespread in tropical America, and in one case (*Cystinoura*) the two island forms are remarkable and distinct species. In the other case (*Ageronia*), three species are reputedly found in Hispaniola, one of which occurs also in Jamaica. There is a long series of Haitian specimens in the American Museum of Natural History, and Mr. Watson tells me that these all represent one form, and that he thinks the other two names are errors of determination. In that case, the Jamaican and Hispaniolan forms are supposedly identical, but different from the continental choromorphs. The distinctness of the *Cystinoura* species may indicate that they, like *Calisto*, were left over from pre-Miocene days, and that there is a form yet to be discovered in Cuba, or that the Cuban form has died out.

The Bahamas and the Lesser Antilles have not been included in this discussion, because exact information on the presence or absence of this or that form from a particular island is lacking. In general, however, these islands show the same faunal type as the Greater Antilles; their faunas are somewhat more depauperate, perhaps, but that may be explained by the smaller areas. Butterflies from all parts of the

Antilles belong to the same genera, often to the same species, and in many cases to the same choromorphs. This may indicate a common origin for the fauna, it may be the result of the selective action of a uniform and common environment, or it may simply mean that a butterfly that can get to one of the islands can, in time, get to all of them.

*Inter-island relationships.* One of the most remarkable things about our table of genera, it seems to me, is that every genus there listed occurs in Hispaniola. The significance of this is even greater when we remember that Hispaniola is the least known of the three islands; the two genera that are questioned in the table quite certainly occur there, as they have been found in Puerto Rico.

Hispaniola, then, is the focus of Antillean distribution. We have only four combinations on our table: Hispaniola, Cuba and Jamaica; Hispaniola and Cuba; Hispaniola and Jamaica; and Hispaniola only. The three other possibilities—Cuba and Jamaica, Cuba only, and Jamaica only—do not occur. If we examine the distribution of species, bearing in mind the fact that Hispaniola is comparatively unknown, we find further evidence for the belief that animal distribution in the West Indies is not haphazard. Barbour (1910, p. 277), speaking of reptiles, has remarked: "A peculiarity of the fauna of Jamaica is the fact that while its proximity to Cuba is practically the same as its distance from Haiti, the evident relationship of the island's fauna with that of Haiti is well marked, while with Cuba it has in common only species which range widely through the West Indian region." We might restate this as a sort of zoögeographic law: any taxonomic category (genus, species, choromorph) found in Cuba and Jamaica will also be found in Hispaniola.

Several apparent exceptions to this will be found in the distributions given in the taxonomic part of this paper, but they almost all involve Lycaenids or Hesperiiids now known only from Cuba and Jamaica: forms that will almost certainly be found in Hispaniola when more collecting has been done there. The only exception with any real significance in the butterflies is that of *Phyciodes pelops*, supposedly with one choromorph in Cuba and Jamaica, and another in Hispaniola; and in this case I have not been able to study specimens from all three islands.

Until a great deal of material from all islands is available for study, speculation as to the significance of this apparent order in Antillean distribution is somewhat idle.

*Distinctness of Fauna.* While our table of genera shows that the fauna is fairly homogeneous, it does not give any indication of its distinctness, beyond the two peculiar genera *Lucinia* and *Calisto*. An examination of the species, however, shows that nearly half are specifically distinct from any known continental forms, and considerably more than half are subspecifically distinct. A residue of about 30% of the West Indian species are common to all of the islands and to wide areas on the mainland. This 30% probably consists of species that today fly from island to island with some frequency. As an alternative, however, it may represent very stable species: we must remember that some of the Oligocene amber ants are indistinguishable from modern species, and if ants sometimes show such stability, we may expect it also in other insect groups. Our information is too limited to permit any sound inferences.

*Summary.* In theory, then, we can conveniently divide the Antillean butterflies into three groups: the first including peculiar and local species, which may have arrived by way of some pre-Miocene land connection, and which thus represent fragments of what may have been once a rich fauna; second, species that have arrived by chance, probably only once or twice, and become established, being isolated for a sufficient length of time to allow for the formation of distinct insular choromorphs; and third, the wide ranging species, that presumably pass from island to island with sufficient frequency to prevent the formation of insular choromorphs, or to keep these choromorphs from developing sharply differentiated characteristics. It would be rash to attempt to assign each species to one or another of these categories, but it seems to me that when we examine the fauna as a whole, the three tendencies stand out strongly.

In summary, we may say that the Antillean butterfly fauna is characterized by its poverty of species, by wide ranging genera, by the absence of many important groups that are well developed in neighboring faunas, and that it is fairly homogeneous and distinct from the other subdivisions of the Neotropical region.

*References.* Besides the papers cited above, Pagenstecher (1907) has written on the distribution of the Lepidoptera of the West Indies. The papers by Barbour (1914) and by Barbour and Ramsden (1919) on the reptiles contain much material of general interest.

## RELATIONSHIPS OF THE CUBAN FAUNA

If we analyse the distribution of the Cuban butterflies, using choromorphs as the basis of our calculations, we get the following results:

		%
Limited to Cuba . . . . .	54	34.2
Cuba and Bahamas . . . . .	5	3.2
Cuba and continent . . . . .	19	12.3
Cuba, Hispaniola and continent . . . . .	8	5.1
Cuba and Hispaniola . . . . .	17	11.0
Cuba and Jamaica . . . . .	1	0.7
Antilles in general . . . . .	22	14.2
Wide ranging . . . . .	30	19.3
	---	-----
	156	100.0%

These figures must be considered as approximations, since our knowledge of the distribution of butterflies in tropical America can by no means be called precise. Choromorphs have not been carefully studied in the American faunas, and probably some of the supposedly wide ranges are based on misdeterminations. The butterflies of Hispaniola, of the Bahamas, and of many areas on the mainland are imperfectly known. Nevertheless the general trend of such a table is probably correct and significant.

The forms limited to Cuba include two types: those with close relatives in neighboring areas, and those without such relatives. To the latter class would belong the so-called relict species, of which *Papilio gundlachianus* is the outstanding Cuban example. The genera *Anelia* and *Calisto* are also apparently relict types. Most of the Cuban forms, however, are obviously local modifications of widespread species.

The Cuban fauna includes many Central American forms that have not reached the other Antillean islands, and in several cases the Cuban choromorph of a species is identical with the Central American form, while the other islands are inhabited by distinct and local subspecies. It looks as though these forms had crossed the Yucatan Channel; yet it is farther from Yucatan to Cuba than it is from Cuba to Jamaica, and there is certainly no general interchange across this last gap. Species with such Central American affinities include *Papilio polydamas*, *Eurema nise*, *E. boisduvaliana*, *Anteos clorinde*, *Phocbis statira*, *Danaus berenice*, *Dynamine mylitta*.

The Florida-Bahamas-Cuba relationship is also very interesting. The Bahamas seem to play the rôle of half-way station between Florida and Cuba. Many Cuban species (*Calisto*, *Athena eleucha*) are found in the Bahamas, but do not reach Florida; some Florida species (*Proteides zestos*) reach the Bahamas, but not Cuba. On the other hand, when the Bahamas and Cuba are inhabited by distinct choromorphs, Florida specimens may show intermediate or mixed characters (*Colaenis*; the Pericopid moth *Composia fidelissima* is a fine example). The Florida fauna itself is a curious mixture of Central American and Antillean elements.

### TAXONOMY

*Nomenclature.* The arrangement of species, genera and families used here is largely adapted from that found in Volume V of the Macrolepidoptera (Seitz), except where this has been supplanted by subsequent revisional work. The entire classification of the butterflies, built largely on superficial characters, is badly in need of revision, but if such revision is to be thorough and sound, the entire world fauna must be taken into consideration. The usual arrangement of Lepidoptera, starting with supposedly specialized groups and ending with generalized forms, is directly opposed to the arrangement used everywhere else in zoölogy, and should eventually be changed. A reversal of this sort, however, in a small faunal paper, would probably be more trouble than help.

The nine families into which the Cuban butterflies are placed do not represent any considered opinion on my part, but are merely the reflection of what seems to be the conservative tendency of lepidopterists. The subfamily question has been sidestepped by omitting all reference to such a category.

It has been necessary to check the history of every generic and specific name used, and even so various points that depend on exotic species could not be settled, and it is almost certain that some pertinent names and type fixations have been overlooked, because the forms directly involved have not been associated with the Cuban fauna. My object has been to place the nomenclature of the Cuban butterflies on a sufficiently firm basis so that future students of the fauna will have a minimum of bother with what should be a minor problem. This has resulted in numerous unfamiliar names and combinations; but these changes seem inevitable, as there is no standard list of American butterflies of sufficient accuracy and consistency to be used as a guide.

The taxonomist's preoccupation with nomenclature has caused some of our fellow zoölogists to heap a deal of ridicule on us, probably in part justified, but also in part based on a misunderstanding of the problem that faces us. Scientific names are essentially *terms for definitions*, as Karl Jordan has pointed out, and as such the precise identification of a given term with a given definition is obviously of major importance, if we are to gain any accuracy in the transmission of our ideas. It is also important, if hopeless confusion is to be avoided, that a given term should be generally recognized as the proper one for a given definition. The various rules of nomenclature that have been proposed for zoölogy aim at placing the selection of a particular term on a purely objective basis, in the hope of thereby achieving this general recognition; with the number of known animal forms fast approaching the million mark, these considerations acquire an added importance. Complete stability of nomenclature is probably both impossible and undesirable, insofar as nomenclature reflects the development of our knowledge and ideas; but it is both possible and desirable insofar as it concerns the association of a given term with a given nuclear, or "type," definition. And if our colleagues laugh because we change the name of an animal, we may gain some comfort by remembering the shifting nomenclature of enzymes, or the impressive synonymy of such a word as "mitochondria."

I have tried to follow the International Rules (1926) as closely as possible in selecting the names used in this paper. The two or three cases in which I have knowingly deviated from the rules all involve groups entirely foreign to the subject of this paper (see under genus XXIV, *Vanessa*, and XLV, *Strymon*). Two Linnean names, *Papilio plexippus* and *Papilio monuste*, of very uncertain application, are involved in the Cuban list. Both names will probably eventually require *nomina conservanda* rulings, and in the meanwhile, I have followed what seemed to be the simplest course consistent with the probabilities, in applying the names.

*Explanation of terms.* An effort has been made to use the most simple and obvious characters possible in preparing the keys and descriptions used in this paper; some word of explanation may not, however, be amiss. Characters taken from the antennae, the palpi and the eyes have occasionally been used. Figures 5 and 7 show profiles of the head, with the palpi. The palpus in butterflies always consists of three segments, usually not visible because of the covering of scales. The last, or third, segment is very useful in classification, as it is quite easily



seen, and varies markedly in relative size and shape. The tongue or proboscis lies curled between the two palpi. The antennae are always clubbed, or at least thickened toward the tip; their relative length, and

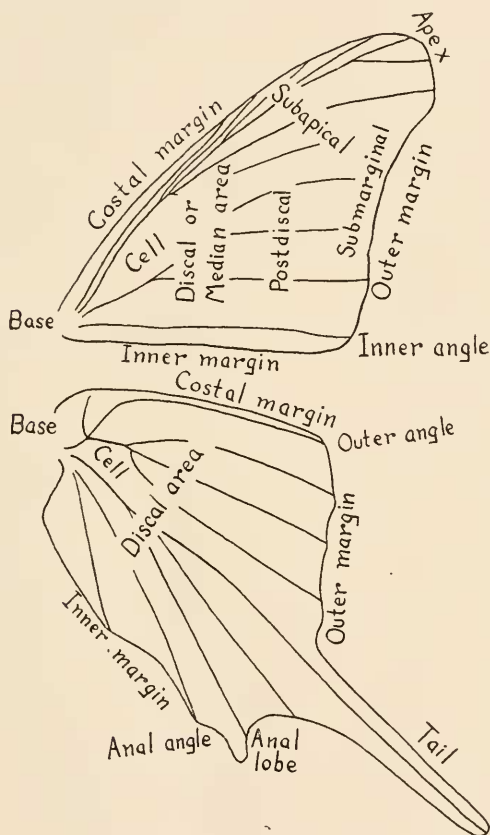


Fig. 2. Outline of wing to show parts. (*Athena chiron*)

the character of the club, are often mentioned in the keys. The eyes are sometimes *hairy*, that is, one can see fine hairs over their entire surface with the aid of a hand lens.

Almost no characters based on the thorax or abdomen are used in this paper. The structure of the legs varies greatly in different butter-

flies, but as this structure is sometimes difficult to see, it has not been used in the keys.

The Comstock-Needham system of naming the wing veins has been used here, as it is usually taught in American schools, and is about as convenient as any. The first vein of the forewing is the *subcostal* (Sc); it is never branched. The next is the *radius* (R), typically with five branches, although one or more of these may be absent. The next three veins belong to the *median* system ( $M_1$ ,  $M_2$ ,  $M_3$ ); the next two to the *cubital* (Cu); and the remaining one or two free veins are *anal* veins (2A and 3A; 1A is absent in the butterflies).

The veins of the hindwing are similar, except that there is only one radial vein (Rs). A small Y-shaped vein at the base of the subcostal of the hindwing is called the *pre-costal* vein (PC). All of the important venation types are illustrated, so that there should be little difficulty in identifying the veins.

Figure 2 shows the outline of the wings of a butterfly, with the various areas used in describing the color pattern labelled. There should be no difficulty with these.

*Diagnosis of butterflies.* The butterflies, in the sense of the word used here, constitute one of the superfamilies of the order Lepidoptera: the *Papilionoidea*. The following diagnosis is adapted from Forbes: The hindwing is much shorter and broader than the forewing, with only a single free radial vein; the forewing has the cubitus straight to the base, sometimes with a rudiment of 1A arising from it near the base, but with the rest of A1 lost. There is no jugum nor frenulum connecting the two wings, but the humeral angle of the hindwing is enlarged, usually with a precostal vein. The antennae are usually more or less obviously clubbed, or at least thickened toward the tip; they are never plumose or pectinate. The tongue and labial palpi are always strong; the ocelli and maxillary palpi are always absent.

In the Cuban fauna, any day-flying insect with a coiled proboscis, with membranous, scaled wings, and with simple antennae, thicker toward the tip than toward the base, is a butterfly.



## CHECK LIST OF CUBAN BUTTERFLIES

*Papilio* Linnaeus

1. *gundlachianus* Felder & Felder
2. *devilliers* Godart
3. *polydamas polydamas* Linnaeus
4. *polyxenes polyxenes* Fabricius
5. *thoas oriedo* Gundlach
6. *cresphontes* Cramer
7. *caiguanabus* Poey
8. *aristodemus temenes* Godart
9. *andraemon andraemon* (Hübner)
10. *androgeus epidaurus* Godman & Salvin
11. *pelaus atkinsi* subsp. nov.
12. *orynius* (Hübner)
13. *celadon* Lucas

*Pieris* Schrank

14. *phileta phileta* (Fabricius)
15. *menciae* Ramsden

*Appias* Hübner

16. *ilaire poeyi* Butler

*Melete* Swainson

17. *salacia* (Godart)

*Eurema* Hübner

18. *lucina* (Poey)
19. *daira palmira* (Poey)
20. *elathea* (Cramer)
21. *messalina messalina* (Fabricius)
22. *nicippe* (Cramer)
23. *boisduvaliana* (Felder & Felder)
24. *amelia* (Poey)
25. *proterpia proterpia* (Fabricius)
26. *gundlachia* (Poey)
27. *nise* (Cramer)
28. *lisa* (Boisduval & Leconte)
29. *dina dina* (Poey)

*Phoebis* Hübner

30. *sennae sennae* (Linnaeus)
31. *philea thalestris* (Illiger)
32. *avellaneda* (Herrich-Schäffer)
33. *argante rorata* (Butler)
34. *agarithe agarithe* (Boisduval)
35. *statira jada* (Butler)
36. *neleis* (Boisduval)
37. *orbis* (Poey)

*Anteos* Hübner

- 38. *maerula maerula* (Fabricius)
- 39. *clorinde nivifera* (Fruhstorfer)

*Kricogonia* Reakirt

- 40. *lyside* (Godart)
- 41. *cabrerai* Ramsden

*Zerene* Hübner

- 42. *cesonia cesonia* (Stoll)

*Nathalis* Boisduval

- 43. *iole* Boisduval

*Dismorphia* Hübner

- 44. *cubana* (Herrich-Schäffer)

*Danaus* Kluk

- 45. *plexippus plexippus* (Linnaeus)
- 46. *gilippus berenice* (Cramer)
- 47. *eresimus* (Cramer)

*Lycorea* Doubleday

- 48. *ceres demeter* Felder & Felder

*Anelia* Hübner

- 49. *numidia* Hübner
- 50. *pantherata clarescens* (Hall)
- 51. *cubana* (Salvin)

*Hymenitis* Hübner

- 52. *cubana* Herrich-Schäffer

*Calisto* Hübner

- 53. *herophile* Hübner

*Heliconius* Kluk

- 54. *charithonia charithonia* (Linnaeus)

*Eueides* Hübner

- 55. *cleobaea cleobaea* Geyer

*Colaenis* Hübner

- 56. *julia nudeola* Stichel

*Dione* Hübner

- 57. *vanillae insularis* (Maynard)

*Euptoieta* Hübner

- 58. *hegesia* (Cramer)

*Phyciodes* Hübner

- 59. *phaon phaon* (Edwards)
- 60. *pelops aegon* (Fabricius)
- 61. *frisja frisja* (Poey)

*Chlosyne* Butler

- 62. *perezi perezi* (Herrich-Schäffer)

*Vanessa* Fabricius

- 63. *atalanta* (Linnaeus)
- 64. *virginiensis virginiensis* (Drury)
- 65. *cardui* (Linnaeus)

*Hypanartia* Hübner

- 66. *paullus* (Fabricius)

*Precis* Hübner

- 67. *coenia* (Hübner)
- 68. *zonalis* (Felder & Felder)

*Anartia* Hübner

- 69. *jatrophae jamaicensis* Möschler
- 70. *lytrea chrysopelea* Hübner

*Metamorpha* Hübner

- 71. *stelenes insularis* (Holland)

*Athena* Hübner

- 72. *chiron* (Fabricius)
- 73. *eleuchea eleuchea* (Hübner)

*Hypolimnas* Hübner

- 74. *misippus* (Linnaeus)

*Historis* Hübner

- 75. *odius odius* (Fabricius)

*Coea* Hübner

- 76. *acheronta* (Fabricius)

*Colobura* Billberg

- 77. *dirce* (Linnaeus)

*Lucinia* Hübner

- 78. *sida* Hübner

*Eunica* Hübner

- 79. *tatila tatila* (Herrich-Schäffer)
- 80. *monima habanae* Seitz
- 81. *pusilla fairchildi* subs. nov.
- 82. *macris heraclitus* Gundlach

*Dynamine* Hübner

- 83. *egaea zetes* (Ménétriés)
- 84. *mylitta bipupillata* Röber

*Adelpha* Hübner

- 85. *iphicla iphimedia* Fruhstorfer

*Doxocopa* Hübner

- 86. *laure druryi* (Hübner)

*Asterocampa* Röber

- 87. *lycaon idyja* (Hübner)

*Prepona* Boisduval

- 88. *antimache crassina* Fruhstorfer

*Siderone* Hübner

89. *nemesis nemesis* (Illiger)

*Anaea* Hübner

90. *clytemnestra iphigenia* (Lucas)  
91. *trogodyta cubana* (Druce)  
92. *verticordia echemus* (Doubleday, Westwood & Hewitson)

*Libythea* Fabricius

93. *carinenta motya* (Hübner)

*Apodemia* Felder & Felder

94. *carteri ramsdeni* (Skinner)

*Eumaeus* Hübner

95. *atala* (Poey)

*Strymon* Hübner

96. *coelebs* (Herrich-Schäffer)  
97. *martialis* (Herrich-Schäffer)  
98. *acis* (Drury)  
99. *favonius* (Abbot & Smith)  
100. *simaethis* (Drury)  
101. *maesites* (Herrich-Schäffer)  
102. *celida* (Lucas)  
103. *columella* (Fabricius)  
104. *angelia* (Hewitson)  
105. *gundlachianus* sp. nov.

*Hemiargus* Hübner

106. *filenus* (Poey)  
107. *ammon* (Lucas)

*Brephidium* Scudder

108. *isophthalma* (Herrich-Schäffer)

*Leptotes* Scudder

109. *theonus* (Lucas)

*Phocides* Hübner

110. *batabano batabano* (Lucas)

*Goniurus* Hübner

111. *marmorosa* Herrich-Schäffer  
112. *dorantes santiago* (Lucas)  
113. *proteus* (Linnaeus)

*Proteides* Hübner

114. *exadeus maysi* (Lucas)  
115. *asander* (Hewitson)  
116. *mercurius sanantonio* (Lucas)

*Polygonus* Hübner

117. *lividus* Hübner

*Telegonus* Hübner

- 118. *talus* (Cramer)
- 119. *anaphus cubanus* Mabille & Boullet
- 120. *jariba jariba* (Butler)
- 121. *xagua* (Lucas)
- 122. *alardus habana* (Lucas)

*Cabares* Godman & Salvin

- 123. *potrillo potrillo* (Lucas)

*Achlyodes* Hübner

- 124. *thraso papinianus* (Poey)

*Ephyriades* Hübner

- 125. *zephodes zephodes* (Hübner)
- 126. *arcas* (Drury)
- 127. *cubensis* Skinner

*Pholisora* Scudder

- 128. *concolor* (Herrich-Schäffer)
- 129. *braco* (Herrich-Schäffer)

*Chiomara* Godman & Salvin

- 130. *mithrax* (Möschler)

*Erynnis* Schrank

- 131. *gesta* (Herrich-Schäffer)
- 132. *zarucco* (Lucas)

*Pyrgus* Hübner

- 133. *syrichtus* (Fabricius)
- 134. *crisia* Herrich-Schäffer

*Ancyloxypha* Felder

- 135. *nanus* (Herrich-Schäffer)

*Adopaea* Billberg

- 136. *magdalia* (Herrich-Schäffer)

*Hylephila* Billberg

- 137. *phyleus* (Drury)

*Atalopedes* Scudder

- 138. *mesogramma* (Latreille)

*Polites* Scudder

- 139. *baracoa* (Lucas)

*Catia* Godman

- 140. *nüsera* (Lucas)

*Poanes* Scudder

- 141. *radians* (Lucas)

*Lerema* Scudder

- 142. *cornelius* (Latreille)

*Phemiades* Hübner

- 143. *antiqua antiqua* (Herrich-Schäffer)

*Lerodea* Scudder144. *eufala* (Edwards)145. *tripuncta* (Herrich-Schäffer)*Calpodes* Hübner146. *ethlius* (Cramer)*Prenes* Scudder147. *nero sylvicola* (Herrich-Schäffer)148. *ocola* (Edwards)149. *panoquinoides* (Skinner)150. *nyctelius coscinia* (Herrich-Schäffer)151. *corrupta* (Herrich-Schäffer)*Asbolis* Mabille152. *capucinus* (Lucas)*Perichares* Scudder153. *coridon coridon* (Fabricius)*Paracarystus* Godman154. *cubana* (Herrich-Schäffer)*Godmania* Skinner & Ramsden155. *malitiosa* (Herrich-Schäffer)*Thracides* Hübner156. *telegonus* (Esper)*Key to Families*

1. Forewing with R five-branched, all of the branches simple, unforked, arising from the cell (figs. 18-24); antennae separated at the base by a distance greater than half of the width of the eye, often with a sharp hook at the tip (the apiculus; fig. 17).  
Family IX . . . . . *Hesperiidae*  
F.w. with some of the branches of R stalked or absent; antennae closer together, the club never with an apiculus. . . . . 2
2. F.w. with Cu apparently four-branched (that is,  $M_2$  arises from the cubital stem), and with two or three anal veins; h.w. with only one anal vein (fig. 3). Family I . . . . . *Papilionidae*  
F.w. with Cu apparently three-branched, and with only one anal vein completely developed, although a second may be present at the base; h.w. with two anal veins . . . . . 3
3. Palpi much longer than thorax . . . . . Family VI. *Libytheidae*  
Palpi not as long as thorax . . . . . 4



4. R of f.w. with five branches<sup>1</sup>; both sexes with forelegs greatly reduced, not functional, except in the Pierid *Dismorphia* . . . . .7  
     R of f.w. with only three or four branches; six well developed legs in female, and usually also in male, although they may be somewhat reduced . . . . .5
5. Vein M<sub>1</sub> of f.w. united with a branch of the radius for a considerable distance beyond the apex of the discal cell (figs. 4, 6); usually white, yellow or orange insects . . . . . Family II. *Pieridae*  
     M<sub>1</sub> of f.w. arising at or near the apex of the discal cell; usually small, dark colored insects . . . . .6
6. PC vein of h.w. present; one small brownish-grey species in Cuba, very rare . . . . . Family VII. *Riodinidae*  
     PC vein absent (figs. 15, 16); small dusky or blue insects, often very common . . . . . Family VIII. *Lycaenidae*
7. All six legs functional; f.w. elongate (fig. 7). (Genus *Dismorphia*).  
     Family II. *Pieridae*  
     Forelegs greatly reduced, not functional . . . . .8
8. Vein Sc of h.w. ending on the costal margin (figs. 9, 11) . . . . .9  
     Vein Sc of h.w. extending to outer margin (figs. 12, 13) . . . . .10
9. Some of the veins of f.w. greatly swollen at the base<sup>2</sup> (fig. 11); the only Cuban species is a small grey butterfly. Family IV. *Satyridae*  
     Veins of f.w. not swollen at base . . . . . Family III. *Danaidae*
10. Wings transparent (one Cuban species; fig. 10, venation).  
     Family III. *Danaidae*  
     Wings fully clothed with scales . . . . . Family V. *Nymphalidae*

### Family I. PAPILIONIDAE

The Cuban Papilionidae are all large butterflies, and with the exception of *P. polydamas*, all bear a tail at vein M<sub>3</sub> of the hindwing. They are easily distinguished from all other groups by the position of M<sub>2</sub> of the forewing, which arises directly from the cubital stem, making that system apparently four-branched.

Since the days of Hübner, the tropical American swallowtails have all been lumped in the one genus *Papilio*. It is unfortunate that

<sup>1</sup>To determine the number of branches of the radius, count the two cubital and three medial branches first; the branches left between M<sub>1</sub> and Sc then belong to the radius.

<sup>2</sup>Two genera of Cuban Nymphalidae, *Eunica* and *Lucinia*, have the veins at the base of the forewing swollen; in both of these the precostal vein of the hindwing is well developed, while it is absent in the Satyrid genus *Calisto*.

Rothschild and Jordan never completed their proposed generic revision of the group, and it is to be hoped that some capable student of the butterflies will take up the task where they left it and carry on. The Cuban species fall into six natural groups, which correspond to the genera of other butterfly families. These groups are:

1. *Hectorides* Hübner, genotype *Papilio agavus* Drury, including the first Cuban species;
2. *Laertias* Hübner, genotype *Papilio philenor* Linn., including species no. 2 and 3;
3. *Papilio* Linnaeus, genotype *Papilio machaon* Linn., including species no. 4;
4. *Heraclides* Hübner, genotype *Papilio thoas* Linn., including species 5 to 10;
5. *Pterourus* Scopoli, genotype *Papilio troilus* Linn., including species no. 11 and 12;
6. *Iphiclides* Hübner, genotype *Papilio podalirius* Linn., to which species no. 13 might well be assigned.

### Genus I. PAPILIO Linnaeus

Genotype, *Papilio machaon* Linn.

This generic name is used here in the broad sense, in conformity with general practise.

#### *Key to species*

1. Underside of abdomen solid yellow . . . . . 2  
     Underside of abdomen not yellow; at most with small yellow spots  
     on the side . . . . . 6
2. Upper surface of f.w. with some yellow in the cell, a spot or band. 3  
     Cell of f.w. wholly dark above . . . . . 4
3. Yellow median band of wings above very wide, occupying about  
     half of the wing area; tail slender, wholly black; yellow in the  
     cell of f.w. forming an irregular spot . 10. *P. androgeus epidaureus*  
     Yellow median band narrower; tail somewhat spatulate, with a  
     yellow spot near tip; a yellow bar across the cell of f.w. near  
     the distal end . . . . . 9. *P. andraemon andraemon*

4. Brown on under surface of h.w. confined to two spots, between veins  $Cu_1-M_3$  and  $M_3-M_2$ .....5  
The brown area extends across the entire wing, and is bordered distally by the median blue spots....8. *P. aristodemus temenus*
5. The fifth yellow spot of the discal row on f.w. above, counting from the apex (the spot between  $M_2$  and  $M_3$ ) is larger than the following spot; the submarginal yellow lunule of this area either absent or barely indicated .....6. *P. cresphontes*  
The fifth spot about the same size as the sixth, with a well developed lunule just distal to it.....5. *P. thoas oviedo*
6. Wings with light green bars and spots; tails long and slender. 13. *P. ecladon*  
Wings not so marked.....7
7. A submarginal row of red spots on h.w. beneath.....10  
Submarginal spots of under surface of h.w. yellow, sometimes partly orange.....8
8. F.w. without submarginal yellow spots above; either entirely black, or with three or four large yellow spots on the disc, near the apex of the cell.....10. *P. androgeus epidaurus*  
F.w. with a row of submarginal yellow spots.....9
9. H.w. below with a yellow and brown spot in the cell; two complete rows of light spots across both wings—a median and a submarginal row.....4. *P. polyxenes polyxenes*  
H.w. below with no markings in the cell; only the submarginal row of spots developed on f.w. above.....7. *P. caiguanabus*
10. F.w. above with a prominent band of iridescent blue. 1. *P. gundlachianus*  
No such band.....11
11. Both wings above with submarginal rows of light spots; the wings show greenish reflections.....12  
No submarginal spots on f.w. above.....13
12. Tailed; under side of h.w. with broad whitish marginal spots. 2. *P. derilliers*  
No tails; margin of h.w. edged thinly with yellow between the veins.....3. *P. polydamas polydamas*
13. F.w. with a creamy band from the costa to the inner angle. 11. *P. pelaus pelaus*  
This band absent, or only partially developed, never reaching the inner angle.....12. *P. orynius*

1. *PAPILIO GUNDLACHIANUS*

## Fig. 3, venation

*Papilio columbus* Herrich-Schäffer (*nec* Hewitson), 1862, p. 141; 1864b, p. 170; Rothschild and Jordan, 1906, p. 436; Jordan in Seitz, V, p. 12, pl. 1a (1907); Bryk, 1930, p. 316.

*Papilio gundlachianus* Felder & Felder, 1864, p. 294; *id.*, Reise Novara, p. 137; Gundlach, 1881, p. 124; Honrath, 1886, p. 131, pl. 5, f. 5; *id.*, 1887, p. 321, pl. 5, f. A; Bonzon, 1888, p. 293; Gundlach, 1891, p. 450.

*Papilio grotei* Blake, 1865, p. 313.

*Blakea gundlachianus*: Grote, 1875, p. 118.

The iridescent blue band of the forewing will distinguish this species at a glance from anything else found in Cuba. The ground color is black, the forewing crossed by a discal blue band from the middle of the costa to the inner angle, and with two or three blue spots on the apex; the hindwing has three or four prominent red spots at the inner angle: a rich deep red in the winter specimens, duller, almost orange, in the summer individuals. The tail of the hindwing is well developed, and the outer margin is somewhat produced at all of the vein endings. Beneath there is a complete row of red submarginal spots on the hindwing. The inner margin of this wing is folded in the male, enclosing a woolly white scent organ. Length of f.w., 40–50 mm.

*Metamorphosis.* The larva has been described by Bonzon, Honrath and Gundlach; it lives on *Aristolochia*.

*Distribution.* This species seems to be confined to the Cuban province of Oriente; it is not very closely related to any other known species. In the M.C.Z. there are 15 specimens from Sardinero, San Carlos and Torquino, taken in January, April and July.

2. *PAPILIO DEVILLIERS*

*Papilio devilliers* Godart, 1819, p. 810 [1824]; Poey, 1846, p. 235; Rothschild and Jordan, 1906, p. 514; Jordan in Seitz, V, p. 20, pl. 6a (1907).

*Papilio villiersii*: Lucas, 1857, p. 485.

*Papilio devilliersi*: Herrich-Schäffer, 1864b, p. 170; Holland, 1931, p. 313, pl. 70, f. 1; Bryk, 1930, p. 365, 626.

*Papilio devilliersii*: Gundlach, 1881, p. 123.

This species is similar to the common North American *P. philenor* on the upper surface, but quite differently marked beneath. The ground color is black, overcast with green on much of the upper side

of both wings; there is a complete row of submarginal spots, whitish on the forewing, light blue on the hindwing; the tail is well developed. The under side of the forewing has a marginal and submarginal row of

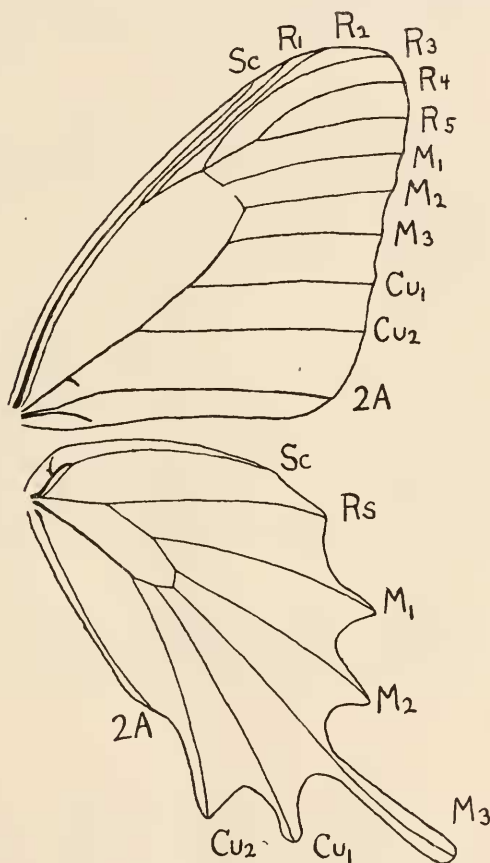


Fig. 3. *Papilio gundlachianus*, venation.

white, triangular spots; on the hindwing there is a submarginal row of dull red spots, bordered externally with silver. Length of f.w., 40-50 mm.

*Met.* Gundlach mentions that the larva feeds on *Aristolochia*, but he does not describe it.

*Dist.* *P. devilliers* has been recorded from Florida and Cuba; it has not, however, been taken in Florida in recent years, and the record needs confirmation. The related *P. zetes* of Hispaniola, which I have not studied, is considered to be specifically distinct. There are 18 specimens in the M.C.Z. from Oriente, Sta. Clara (Soledad) and Habana.

### 3. PAPILIO POLYDAMAS POLYDAMAS

*Papilio polydamas* Linnaeus, 1758, p. 460; Poey, 1846, p. 236; Herrich-Schäffer, 1864, p. 170; Gundlach, 1881, p. 121; *id.*, 1891, p. 450; Bryk, 1930, p. 367, 626; Holland, 1931, p. 312, pl. 41, f. 4.

*Papilio polydamas polydamas*: Rothschild and Jordan, 1906, p. 520; Jordan in Seitz, V, p. 21, pl. 6b (1907).

This protean butterfly, which seems to have formed a distinct choromorph on every West Indian island, is represented in Cuba by specimens that, for the most part, cannot be distinguished from those found on the mainland of Central America. The upper side of the wings is black, with green reflections over much of the surface, and with a complete row of golden submarginal spots, large and quadrangular, on the hindwing. The under side is lighter, with narrow red submarginal spots on the hindwing. Length of f.w., 40–50 mm.

*Mct.* The larva, often described, lives on various species of *Aristolochia*.

*Dist.* This butterfly is very widely spread in the tropics of continental America; in Cuba, it is common wherever its food plant grows (Gundlach). In the M.C.Z. there are 15 specimens from Oriente, Camagüey, Sta. Clara (Soledad) and Habana.

### 4. PAPILIO POLYXENES POLYXENES

*Papilio polyxenes* Fabricius, 1775, p. 444; Gundlach, 1881, p. 136; Bryk, 1930, p. 381.

*Papilio asterias*: Poey, 1846, p. 235; Lucas, 1857, p. 480.

*Papilio asterius*: Herrich-Schäffer, 1864b, p. 169.

*Papilio polyxenes polyxenes*: Rothschild & Jordan, 1906, p. 547; Jordan in Seitz, V, p. 23, pl. 8a (1907).

The sexes of this species are somewhat dissimilar. Both have two complete rows of yellow spots on the outer half of the wings: the submarginal spots small, rounded; the inner spots larger, especially



in the male, where they cover the disc of the hindwing. There is a variable amount of blue scaling between these two rows of yellow spots, confined to the hindwing in the male, more extensive in the female. The anal spot of the hindwing has a black pupil, circled by orange above, yellow below. The under surface repeats the pattern of the upper, but many of the spots, especially on the hindwing, are orange rather than yellow. Length of f.w., 42-48 mm.

The name *polyxenes* is used here in the restricted sense given it by Rothschild and Jordan. It is very unlikely that Fabricius had Cuban specimens, as no other butterflies peculiar to Cuba were described by him; it would seem, however, that Rothschild and Jordan were quite justified in their procedure of selecting a type locality for the name, and there is certainly no object in introducing further changes. *P. polyxenes* Fabricius is not preoccupied by *P. polixenes* Fabricius, as listed by Barnes and Benjamin (1926, p. 5), as the former name has page precedence.

*Met.* The life history of *P. polyxenes asterius* has often been described, and Gundlach has described the larva of the Cuban form. Various plants of the family Umbelliferae serve as hosts.

*Dist.* The Cuban form differs from the North American chiefly in the broader discal band of the hindwing in both sexes, and in the larger submarginal spots of the under surface. Choromorphs have been described from South and Central America, but the species is known only from Cuba in the West Indies. Gundlach supposed that it was introduced from North America, but the racial differences would seem to preclude the possibility of this introduction having occurred within historic times. It has been found only in the vicinity of Habana, whence there are 6 specimens in the M.C.Z.

## 5. PAPILIO THOAS OVIEDO

*Papilio thoas*: Poey, 1846, p. 234.

*Papilio cresphontes*: Herrich-Schäffer, 1864b, p. 169 (*part.*)

*Papilio oviedo* Gundlach, 1866, p. 279, pl. 5, f. 1, 2; *id.*, 1881, p. 133.

*Papilio cresphontes* var. *oviedo*: Gundlach, 1886, p. 132.

*Papilio thoas oviedo*: Rothschild & Jordan, 1906, p. 557; Jordan in Seitz, V, p. 24 (1907).

*Papilio thoas* var. *oviedo*: Bryk, 1930, p. 395, 628.

The Cuban *thoas* may be distinguished from *cresphontes* by the wider discal band of the forewing, the less developed anal spot of the hindwing, and the larger size of the blue spots of the under side of the

hindwing, as well as by the character used in the key. Length of f.w., 48-58 mm.

*Met.* Gundlach bred this species from a pupa found on the trunk of Ayúa (*Zanthoxylum*).

*Dist.* *Papilio thoas* is very widely distributed in tropical America, and many subspecies have been described; *oriedo* from Cuba and *melonius* from Jamaica are the only known Antillean choromorphs. There are 5 specimens in the M.C.Z. from the Trinidad Mts. in Sta. Clara: San Blas and Buenos Aires, 2000 to 3000 ft., July and August. The U.S.N.M. specimens are from Oriente: Santiago and Baracoa.

#### 6. PAPILIO CRESPHONTES

*Papilio cresphontes* Cramer, Pap. Ex., II, p. 106, 107, pl. 165, f. A, 166, f. B (1777); Herrich-Schäffer, 1862, p. 141; *id.*, 1864b, p. 169 (*part.*); Gundlach, 1881, p. 131; Rothschild & Jordan, 1906, p. 562; Jordan in Seitz, V, p. 24, pl. 7a (1907); Bryk, 1930, p. 398; Holland, 1931, p. 317, pl. 42, f. 3.

I have not seen any Cuban specimens of this species, but the records seem to be unquestionable. It may be distinguished by the characters mentioned under *oriedo* above. The male genitalia of the two species are very distinct, as *thoas* has a long dorsal process so slightly developed in *cresphontes* that a space may be seen between the claspers above, without dissection. Length of f.w., 50-60 mm.

*Met.* The larva has been described by Gundlach and by various writers on North American butterflies. Gundlach lists as food plants Ayúa (*Zanthoxylum*), Caisimon (*Piper peltatum* and *umbellatum*) and Platanillo (*Piper aduncum* and other species). It is a minor pest of oranges in Florida, a rôle that is taken over by *P. andraemon* in Cuba.

*Dist.* This species was described from New York, South Carolina and Jamaica (*alia sp.!*); it ranges from Canada through Central America, but in the West Indies it has been recorded only from Cuba where, according to Gundlach, it occurs generally over the island.

#### 7. PAPILIO CAIGUANABUS

*Papilio caiguanabus* Poey, 1854b, p. 442, pl. 15, f. 1, 2, 3, 4, [1852]; Lucas, 1857, p. 485; Herrich-Schäffer, 1862, p. 174; *id.*, 1864b, p. 170; Gundlach, 1881, p. 127; Rothschild & Jordan, 1906, p. 567; Jordan in Seitz, V, p. 25, pl. 8c (1907); Bryk, 1930, p. 403, 628.

This insect differs markedly from the other Cuban species of the *thoas* Group in that the ground color of the underside of the wings and abdomen is black. The usual yellow discal band is absent both above and below, on both wings, and in the female the submarginal band of the hindwing above is composed of very light blue spots, not yellow as in the male. The anal angle of the hindwing is marked with orange and blue as in the related species. The under side of the hindwing shows some blue spots between the veins on the disc, as well as two dark orange spots between veins  $M_2$ - $M_3$  and  $M_3$ - $Cu_1$ . The large submarginal spots are light orange in the female, yellow in the male. Length of f.w., 43-50 mm.

*Dist.* This species is known only from Cuba; *Papilio aristor* of Hispaniola seems to be its closest relative. In the M.C.Z. there are 9 specimens from various localities in Oriente, from sea level to 1000 ft.; the U.S.N.M. material is from Oriente and Matanzas.

#### S. PAPILIO ARISTODEMUS TEMENES

*Papilio temenes* Godart, 1819, p. 63; Oberthur, 1897, p. 176, f. 4.

*Papilio aristodemus*: Poey, 1846, p. 235; Lucas, 1857, p. 483, pl. 16, f. 2, 2a.

*Papilio cresphontinus*: Gundlach, 1881, p. 130.

*Papilio aristodemus temenes*: Rothschild & Jordan, 1906, p. 569; Jordan in Seitz, V, p. 25, pl. 7c, (1907).

*Papilio aristodemus* var. *temenes*: Bryk, 1930, p. 404.

The pattern of this insect is very similar to that of *cresphontes* and *thoas*, but the ground color is lighter, brown rather than black, and the median spots are scarcely distinct, tending to fuse into a solid yellow band. The tail has no central yellow spot above. The most outstanding character of the under surface is the extension of the brown of the hindwing, pointed out in the key. Length of f.w., 52 mm.

*Dist.* The three known choromorphs of *aristodemus* inhabit Florida (*ponceana*), Cuba (*temenes*) and Hispaniola (the name type). *Temenes* is limited to Cuba, where Gundlach found it in the vicinity of Habana and Colon. Rothschild and Jordan list it from Gibara (north coast of Oriente). There is one female in the M.C.Z. from Oriente (Santiago de Cuba); the U.S.N.M. specimens are from Santiago de Cuba and Matanzas.

## 9. PAPILIO ANDRAEMON ANDRAEMON

*Heracles andraemon* Hübner, Ex. Schm., II, pl. 98, ff. 1, 2, (182-?).

*Papilio andraemon*: Poey, 1846, p. 235; Lucas, 1857, p. 476; Herrich-Schäffer, 1864b, p. 169; Gundlach, 1881, p. 128; Holland, 1916, p. 500; Bryk, 1930, p. 405, 628.

*Papilio andraemon andraemon*: Rothschild & Jordan, 1906, p. 571; Jordan in Seitz, V, p. 25, pl. 8b (1907).

This is one of the commonest Cuban *Papilios*. It is easily distinguished from its congeners by the broad, solid yellow band across both wings, the absence of submarginal spots on the forewing, the long tails, and the yellow bar in the cell of the forewing. Length of f.w., 45-52 mm.

*Met.* The larva, which feeds on *Citrus* and *Ruta*, was described by Gundlach.

*Dist.* This species is known from Cuba (name type), the Bahamas (*bonhottei*) and Great Cayman (*tailori*). In the M.C.Z. there are 32 specimens from Oriente, Camagüey, Sta. Clara (Soledad), Habana and the Isle of Pines; there are specimens in the U.S.N.M. from Matanzas.

## 10. PAPILIO ANDROGEUS EPIDAURUS

*Papilio polycæon*: Poey, 1846, p. 234; Lucas, 1857, p. 479; Herrich-Schäffer, 1862, p. 141; Gundlach, 1881, p. 134; *id.*, 1891, p. 454.

*Papilio epidaurus* Godman & Salvin, *Biologia*, 2, p. 224, pl. 69, f. 1, 2, 3 (1890).

*Papilio androgeus epidaurus*: Rothschild & Jordan, 1906, p. 578; Jordan in Seitz, V, p. 26 (1907).

*Papilio androgeus* var. *epidaurus*: Bryk, 1930, p. 413.

The male has a very broad yellow discal band across both wings, and a slender black tail. Beneath it is mostly yellow, with submarginal rows of blue and brown spots on the hindwing. Central American females which, according to Rothschild and Jordan, are the same as the West Indian ones, are deep blue over most of the upper surface, with the apex of the cell yellow, and elongate yellow spots outside the cell between veins  $Cu_1$  and  $M_1$ . Gundlach, however, describes the Cuban female as lacking the yellow on the forewing, and a single female in the M.C.Z. from Haiti agrees with this. Length of f.w., 67 mm. (Haiti).

*Met.* Gundlach found the larva on orange, lemon, and other species of *Citrus*.

*Dist.* *Androgeus* ranges over most of tropical America; the choromorph *epidaurus* was described from Central America, and it has been reported from various West Indian islands. It is impossible to be sure of the relationship of the Cuban and Hispaniolan form without more material, but it is almost certainly not *epidaurus*. Gundlach states that in certain places in Cuba where oranges are common, this species is not rare; the only Cuban specimen that I have seen is in the A. N. S. P., from Oriente (Guantanamo).

11. *PAPILIO PELAUS ATKINSI* subsp. nov.

*Papilio pelaus*: Herrich-Schäffer, 1862, p. 141; *id.*, 1864b, p. 170; Gundlach, 1881, p. 126; Bryk, 1930, p. 433, 631 (*part.*).

*Papilio pelaus pelaus*: Rothschild & Jordan, 1906, p. 603 (*part.*); Jordan in Seitz, V, p. 28, pl. 7b (1907) (*part.*).

The upper surface is black, with a creamy white band running almost straight from the inner angle of the forewing to the middle of the costa, and with similarly colored marginal lunules on the hindwing, where there are also several (4 in the male, 6 or 7 in the female) brick-red submarginal spots, extending upward from the anal angle. The tail is well developed, black. The under surface is similar to the upper, except that the submarginal red spots of the hindwing form a complete row, each spot edged with white. Length of f.w., 48 mm.

*Met.* Gundlach found a pupa on the trunk of Ayúa (*Zanthoxylum*); Cockerell (1893, p. 450) has given a brief description of the larva of the Jamaican form.

*Dist.* This choromorph is limited to Cuba, the name type is found in Jamaica, and another form (*imerius*) occurs in Hispaniola. The inclusion of the Cuban and Jamaican forms under one choromorph name, as is done by Rothschild and Jordan, gives a false impression of relationship. The Jamaican and Hispaniolan forms agree in the reduced red spots of the upper surface of the hindwing, but differ in the form of the cream band of the forewing; the Jamaican and Cuban forms agree in the form of the band on the forewing, but differ in the red spots of the hindwing, as Rothschild and Jordan pointed out. These spots are much larger in the Cuban form, almost entirely red, while the first spot, at least, in Jamaican specimens is usually yellow. This seems to be a rare species in Cuba, restricted to Oriente, according to Gundlach. In the M.C.Z. there is a single male from Guantanamo (April), the holotype.

## 12. PAPILIO OXYNIUS

*Laertias oxynius* Hübner, Ex. Schm., III, pl. 3, f. 1, 2 (183-?).

*Papilio augustus* Boisduval, 1836, p. 358.

*Papilio oxynius*: Poey, 1846, p. 236; Herrich-Schäffer, 1864b, p. 170; Gundlach, 1881, p. 127; *id.*, 1891, p. 452; Rothschild & Jordan, 1906, p. 603; Jordan in Seitz, V, p. 28, pl. 10b (1907); Bryk, 1930, p. 434, 631.

*Papilio (Laertias) oxynius*: Lucas, 1857, p. 483.

This species is similar to *pelaus*, but the marginal lunules are much more strongly developed on both wings, the creamy transverse band of the forewing is usually absent in the male, and represented by only a few isolated spots in the female; the red submarginal spots of the hindwing also tend to disappear in the male, and are greatly reduced in the female. The under side of the hindwing has a discal row of small elongate white spots (reduced in the male) in addition to the submarginal red spots. Length of f.w., 42-45 mm.

*Met.* The larvae feed on Ayúa (*Zanthoxylum*) and are gregarious, according to Gundlach. They feed during the night, and rest by day in large colonies on the trunk of the tree.

*Dist.* This species has been reported only from Cuba where, according to Gundlach, it is found over the entire island. In the M.C.Z. there are 8 specimens from Oriente (Sierra Maestra, 1000 ft., Querci) and Sta. Clara (vicinity of Soledad): May, June, July, Sept. and Nov.

## 13. PAPILIO CELADON

*Papilio sinon*: Poey, 1846, p. 236; Herrich-Schäffer, 1864b, p. 169.

*Papilio celadon* Lucas, 1852, p. 130; 1857, p. 478; Gundlach, 1881, p. 125; Rothschild & Jordan, 1906, p. 691; Jordan in Seitz, V, p. 39, pl. 14c (1907); Holland, 1916, p. 500; Bryk, 1930, p. 487, 634; Holland, 1931, p. 321, pl. 70, f. 11.

This insect may be at once distinguished from anything else occurring in Cuba by the pale green bands that take up a large part of the wing surface. There is a prominent red anal spot on the hindwing above, repeated below. Length of f.w., 30-40 mm.

*Dist.* *P. celadon* has been reported from Florida and Cuba; the related forms in Jamaica (*marcellinus*) and Hispaniola (*zonaria*) seem sufficiently distinct to be called "species" as we have defined the word. There are 11 specimens in the M.C.Z. from Oriente and Camagüey, July, Sept. and Oct.; the U.S.N.M. specimens are from Pinar del Río (Santiago de los Baños and Guanajay).



## Family II. PIERIDAE

The Pieridae form a characteristic group of butterflies, the "whites" and "yellows;" only the single rare species of *Dismorphia* is atypical in the Cuban fauna. The fact that all six legs are completely developed and functional will serve to separate the Pierids from the Nymphalids at a glance. Klots (1933) has recently revised the genera of the family.

*Key to genera*

1. Radius of f.w. five-branched;  $M_1$  not fused with a radial branch at its base, arising free from the cell; wings elongate, black, marked with yellow and orange. (Fig. 8) .....XI. *Dismorphia*  
 Radius of f.w. with three or four branches;  $M_1$  fused with  $R_{3-4}$  for some distance beyond the tip of the cell; wings of normal shape, usually yellow, white or orange.....2
2. 3rd joint of palpus short, usually little more than a knob on the end of the 2nd joint. (Fig. 7.).....6  
 3rd joint of palpus elongate, as long as or longer than the 2nd joint. (Fig. 5.) .....3
3.  $R_3$  and  $R_4$  branch very close to the apex of the wing, and are very short; in the Cuban species  $R_3$  is shorter than the distance between its end and  $R_4$ .....II. *Pieris*  
 These veins longer:  $R_3$  as long as or longer than the distance between its tip and the tip of  $R_4$ .....4
4. Precostal of h.w. present, well developed; ground color of upper surface, at least of f.w., white.....5  
 Pc absent, or barely discernable as a slight knob; ground color of upper surface yellowish.....VI. *Phoebis* ♀
5.  $R_2$  of f.w. arising near the apex of the cell; h.w. below with a straight dark line that touches the end of the cell, and is perpendicular to the costal margin. (Fig. 4.).....IV. *Melete*  
 $R_2$  arising considerably before the end of the cell; no such bar on h.w. below.....III. *Appias*
6. Large butterflies, f.w. more than 30 mm. long; outer margin of f.w. above never broadly bordered with solid black; discocellular vein between  $M_2$  and  $M_3$  at end of cell of f.w. about equal in length to that between  $M_3$  and  $Cu_1$ .....7  
 Small butterflies, f.w. less than 30 mm. long; or if larger, with f.w. heavily bordered with black above; discocellular  $M_2$ - $M_3$  longer than  $M_3$ - $Cu_1$ .....8

7. Apex of f.w. produced, falcate; h.w. toothed at  $M_3$ ...VII. *Anteos*  
Apex of f.w. normal; h.w. not toothed at  $M_3$  .....VI. *Phocbis*
8. Radius of f.w. with only three branches; small butterflies with  
elongate forewings.....X. *Nathalis*  
Radius of f.w. with four branches; wings normal in shape.....9
9. Antennae not distinctly clubbed, thickening gradually toward  
the tip; apex of f.w. produced, slightly falcate; f.w. heavily  
bordered with black above, and with a prominent round black  
spot at end of cell.....IX. *Zerene*  
Antennae with distinct club; apex of f.w. not especially pointed in  
Cuban species; wings not marked as described above.....10
10. Palpi long, projecting in front of head about as far as the eye is  
wide; usually greenish white butterflies, with base of f.w. orange;  
f.w. not bordered with black.....VIII. *Kricogonia*  
Palpi short, scarcely projecting in front of head; small, very  
common butterflies, yellow, orange or white, with f.w. more  
or less heavily margined with black in all Cuban species.  
(Fig. 6, 7).....V. *Eurema*

## Genus II. PIERIS Schrank

Genotype, *Papilio brassicae* Linnaeus.

### Key to species

1. Outer margin of f.w. above with no black, or at most a faint edging  
of black.....15. *P. meneiae*  
Outer margin of f.w. bordered with black, which extends in on  
the veins.....14. *P. phileta*

### 14. PIERIS PHILETA PHILETA

? *Papilio monuste* Linnaeus, 1764, p. 237.

*Papilio phileta* Fabricius, 1775, p. 471.

*Pieris philete*: Godart, 1819, p. 141.

*Pieris evonina* Boisduval, 1836, p. 493.

*Pieris vallei* Boisduval, 1836, p. 494; Lucas, 1857, p. 491, pl. 15, f. 1, 1a.

*Pieris joppe* Boisduval, 1836, p. 495; Lucas, 1857, p. 491, pl. 15, f. 2, 2a.

*Pieris monuste*: Poey, 1846, p. 298; Herrich-Schäffer, 1864b, p. 168; Gundlach, 1881, p. 100; Holland, 1916, p. 496.

*Pieris monuste evonina*: Röber in Seitz, V, p. 53 (1909).

*Ascia monuste*: Holland, 1931, p. 278, pl. 35, f. 1, 2; pl. 67, f. 15, 16, 17, 18.

[*Pieris*] *phileta*: Talbot, 1929, p. 56.

*Ascia monuste evonina*: Talbot, 1932, p. 209.

Cuban males are usually white on both surfaces, the forewing heavily bordered with black on the outer margin above, projecting inward on the veins. The females are darker, with the wings more heavily bordered with black, and with the under side tending to become mottled. In all except two of our Cuban females there is an isolated black spot at the tip of the cell of the forewing. Length of f.w., 25-30 mm.

This butterfly, which ranges widely over the American tropics, is very variable, both individually and geographically, and it has received an amazing number of names. Talbot (1929) has discussed the application of the name *monuste* at some length. There are three possible interpretations of this name: (1), it may apply to the North American insect, as determined by Fabricius (1775, p. 470); (2), it may be a Chinese species, as figured by Cramer (1777, Pap. Ex., 2, pl. 141, f. F), and as pointed out by Godart (1819, p. 141); or (3), it may be the South American form figured by Hübner (Samm. Ex. Schm., 1, pl. 137), as fixed by Aurivillius in 1882. Excellent arguments can be found for each of these possibilities, and the name of the Cuban insect would be different in each case. If the first is followed, the Cuban choromorph becomes *Ascia monuste monuste*; the second, *Pieris phileta phileta*; the third, *Ascia monuste phileta*. From our point of view it seems best to reject the name *Papilio monuste* as of uncertain application in the American fauna, and to apply the next available name, *Papilio phileta* Fabricius.

The name *phileta* applies, strictly, to very dark females common in the Southern United States. A glance at a series of this butterfly from various parts of Middle America would seem to indicate the existence of several distinct choromorphs, but a careful study of the several hundred specimens from this area in the M.C.Z. fails to substantiate any such division. Specimens from Florida, Cuba, the Bahamas, St. Thomas, Lower California and Honduras show no choromorph differences in the male genitalia, although some of the South American forms do show such differences. Perhaps *P. phileta virginia* from Jamaica, Hispaniola, Puerto Rico and the Virgin Islands deserves separation, but specimens from the Bahamas and Florida often show the deep yellow color of the under side of the hindwing supposedly characteristic of *virginia*. The butterfly is a great migrant, and it is difficult to be sure that a uniform set of specimens from a given locality does not simply indicate a temporary "pure line," or a local or seasonal phenotype. I can certainly find no basis for the recognition of more than one choromorph in the Florida-Bahamas-Cuba area, and it is to this that the name *phileta* seems to apply.

The generic name *Ascia* Scopoli seems to depend directly on the Linnean name *monuste*, as Scopoli proposed the genus purely on a basis of the Linnean descriptions of the species he included. Scudder's designation of *monuste* as the genotype of *Ascia* is valid. If *monuste* is identical with *Pieris cyenïs* Hewitson, *Ascia* must replace *Belenois* or *Udaina*, depending on how those genera are defined. The generic name *Pieris* is used here, in a rather wide sense, as the best way out of the further problems that arise when we consider the possible other names, *Mancipium* of Hübner and *Ganyra* of Dalman.

*Met.* Gundlach lists the larva from cabbage (*Brassica*), *Cleome* and *Tropaeolum*.

*Dist.* In the M.C.Z. there are 100 specimens from Oriente, Sta. Clara (Soledad) and Habana.

#### 15. PIERIS MENCIAE

*Pieris menciae* Ramsden, 1915, p. 15.

*Ascia menciae*: Talbot, 1932, p. 212.

The male of this species is pure white, except that the apex of the forewing is very faintly edged with black. It can easily be distinguished from any other Cuban butterfly by the chalky-white modified scales that margin the veins on the discal part of the wings above. Below, the apex of the forewing and the entire hindwing is "ivory yellow." The female is similar to the male, but lacks the sex scaling on the veins. Length of f.w., 30-32 mm.

*Dist.* I have seen only the types, which are in the A.N.S.P., from Guantanamo. This species may be the Cuban representative of the continental *P. sevata*; I have not been able to compare specimens of the two forms.

#### Genus III. APPIAS Hübner

Genotype, *Papilio zelmira* Cramer.

Röber in Seitz (p. 105, pl. 25c, 1909) described a species from Cuba as *Appias peregrina*; Hall (1925, p. 163) subsequently reported the species from Hispaniola. I have seen nothing like it in the Cuban material examined, and the localities in Seitz are very unreliable, so the name has been listed here as "doubtful."

16. *APPIAS ILAIRE POEYI*

*Pieris ilaire*: Poey, 1832, no. 12, 3 figs.; *id.*, 1846, p. 297; Herrich-Schäffer, 1864, p. 168.

*Appias poeyi* Butler, 1872, p. 49.

*Pieris poeyi*: Gundlach, 1881, p. 103.

*Appias drusilla poeyi*: Röber in Seitz, V, p. 68 (1909).

*Tachyris ilaire*: Holland, 1916, p. 496.

*Melete ilaire* form *neumoegeni*: Holland, 1931, p. 277, pl. 35, f. 5.

*Andropodum drusilla molpadia*: Talbot, 1932, p. 185.

The male is pure white above except for a fine dark border on the forewing, and some black scaling toward the base of the costa of this wing. Beneath, the hindwing and the tip of the forewing are slightly yellowish, and both wings are touched with orange at the base. The female is much darker, with heavy wing borders. Sometimes both the fore- and hindwing are bordered with black, sometimes only the forewing. The hindwing is yellowish above, pearly white below; the base of the forewing is orange below. Specimens of this sex are quite variable. Length of f.w., 24–30 mm.

*Dist.* The choromorph *poeyi* seems to be limited to Florida, the Bahamas, Cuba and Hispaniola, other forms occurring in Jamaica, Central and South America. In the M.C.Z. there are 24 specimens from Oriente, Sta. Clara (Soledad) and Habana.

Genus IV. *MELETE* Swainson

Genotype, *Papilio lycimnia* Cramer.

*Daptonoura* Butler, genotype, *Papilio lycimnia* Cramer.

17. *Melete salacia*

Fig. 4, venation; 5, profile of head.

*Pieris salacia* Godart, 1819, p. 144; Boisduval, 1836, p. 489; Poey, 1846, p. 299; Herrich-Schäffer, 1864b, p. 168.

*Daptonoura salacia*: Gundlach, 1881, p. 105.

*Melete lycimnia cubana* Fruhstorfer, 1908, p. 171.

*Daptonoura salacia cubana*: Röber in Seitz, V, p. 77 (1909).

*Melete salacia cubana*: Talbot, 1932, p. 56.

The male is white above, the apex of the forewing tipped with black. Beneath, the forewing is white, marked with orange basally, while the hindwing is yellowish; the apex of the forewing, a spot at the tip of the

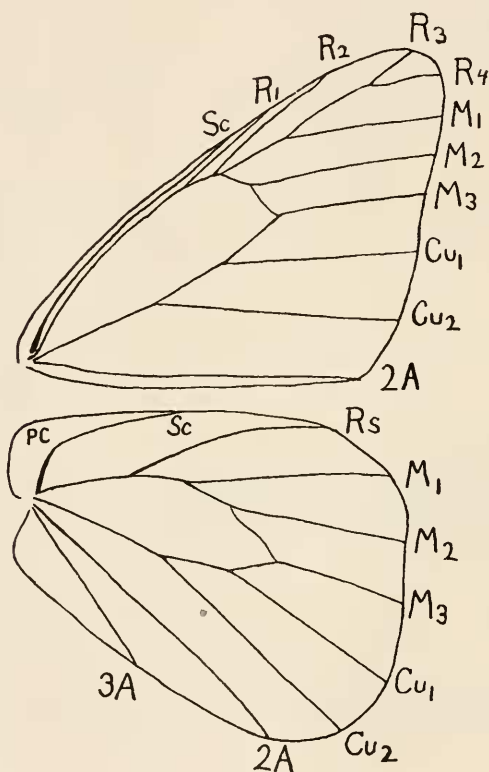


Fig. 4. *Melete salacia*, venation.

cell of this wing, and the outer margin of the hindwing, are black; the characteristic line across the disc of the hindwing is mentioned in the key. The female is similar, but more heavily marked. Length of f.w., 24–28 mm.

Godart described this species without locality, but Hispaniola may be presumed to have been the source of his specimens, as most of his West Indian material came from that island. The locality "Mexico"



sometimes quoted seems to be an error. I have not been able to compare Cuban and Hispaniolan specimens; if the two populations are distinct, Fruhstorfer's name is available for the Cuban form.

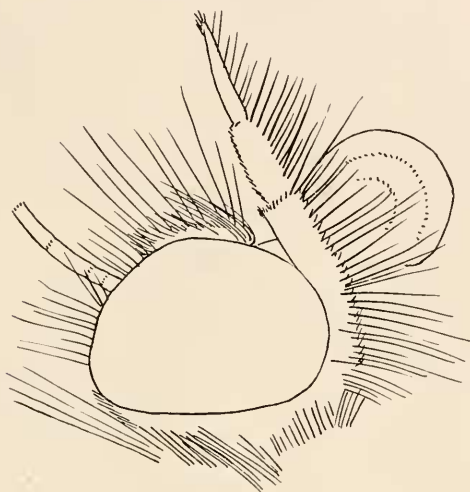


Fig. 5. *Melete salacia*, profile of head.

*Met.* Gundlach found the larvae on "roble-guayo" (*Petitia*). Fairchild and I found it feeding on a mistletoe, *Phoradendron Randiae*, at Soledad.

*Dist.* This species occurs everywhere in Cuba, according to Gundlach; there are 34 specimens in the M.C.Z. from Oriente and Sta. Clara (Soledad).

#### Genus V. *EUREMA* Hübner

Genotype, *Pieris daira* Godart.

*Terias* Swainson, genotype *Papilio hecabe* Linn.

The American species of this genus have lately been reviewed by Klots (1928, 1929). The Cuban species are, for the most part, easily distinguished, although they present several as yet unsolved taxonomic problems.

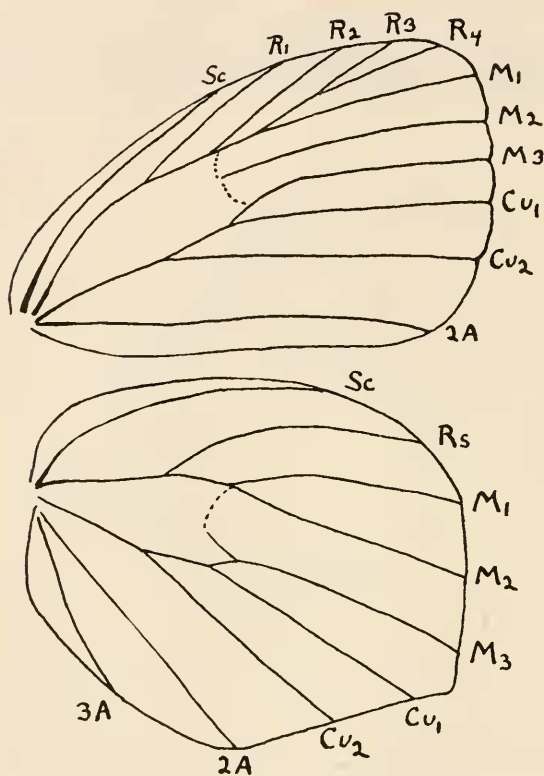


Fig. 6. *Eurema proterpia proterpia*, venation

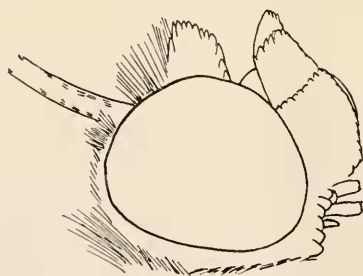


Fig. 7. *Eurema lisa*, profile of head.

*Key to species*

1. Ground color of upper side of h.w. white.....2  
Ground color of upper side of h.w. yellow or orange.....10
2. F.w. with a black bar on the inner margin above.....3  
No such bar.....5
3. Ground color of upper side of f.w. white.....18. *E. lucina* ♂  
Ground color of upper side of f.w. yellow.....4
4. No grey hairs in the black bar on the inner margin of f.w., or these hairs limited to the base.....20. *E. clathea* ♂  
This bar includes a few scattered grey hairs for its entire length.  
19. *E. palmira* ♂
5. The apical black patch of f.w. extends along the outer margin to the inner angle; the narrow outer border of h.w. is complete (except in ♀ *E. amelia*, where it is lacking).....6  
The apical black patch of f.w. is cut off at Cu<sub>2</sub> or above, not reaching the inner margin; the border of h.w. is usually incomplete or interrupted.....7
6. Both wings with black dots at the end of the cell...24. *E. amelia*  
No such dots.....21. *E. messalina* ♂
7. F.w. with a small but distinct black dot at the end of the cell above.  
some ♀ ♀ of 28. *E. lisá*  
No discocellular spot.....8
8. Under side of h.w. with a distinct pink patch at the outer angle.  
21. *E. messalina* ♀  
No such patch.....9
9. Under side of f.w. with a black bar at the end of the cell.  
18. *E. lucina*  
No markings at end of cell, or two separated dots. 19. *E. palmira* ♀
10. Ground color of f.w. orange.....11  
Ground color of f.w. yellow.....14
11. Upper side of h.w. with a heavy black border; a black spot at the tip of the cell of f.w. above.....22. *E. nicippe*  
Border of h.w. narrow and indistinct, or represented by black dashes on the veins; no spot at end of cell of f.w.....12
12. Outer margin of h.w. evenly rounded.....29. *E. dina*  
Outer margin of h.w. angled or toothed between veins M<sub>3</sub> and Cu<sub>1</sub> (Fig. 6).....13

13. Under side of h.w. immaculate yellow, or with only a few isolated patches of brown scales.....25. *E. proterpia*  
Under side of h.w. with a heavy reticulate pattern of brown and reddish over the whole surface.....26. *E. gundlachia*
14. H.w. distinctly angled at vein  $Cu_1$ .....23. *E. boisduvaliana*  
H.w. with outer margin rounded.....15
15. Outer margin of h.w. tinged with orange above; marginal band of this wing either a thin uniform line ( $\sigma$ ), or represented only by minute spots on the vein endings, or absent ( $\varphi$ )...29. *E. dina*  
H.w. uniform yellow, with a well developed marginal band on the upper part of the outer margin at least.....16
16. Fringe of wings pink; a small black dot at end of cell of f.w. above.  
28. *E. lisa*  
Fringe of wings yellow; no cell spot.....27. *E. nise*

## 18. EUREMA LUCINA

*Terias lucina* Poey, 1853, p. 252, pl. 18, f. 8, 9, 10; Herrich-Schäffer, 1864b, p. 167; Holland, 1916, p. 499.

*Terias fornsi* Poey, 1854b, p. 443.

*Terias arabella* Lucas, 1857, p. 515, pl. 16, f. 5, 5a.

*Terias conjungens* Herrich-Schäffer, 1864b, p. 167.

*Eurema lucina*: Gundlach, 1881, p. 95; Klots, 1929, p. 123, pl. I, f. 1, 2.

*Eurema fornsi*: Gundlach, 1881, p. 96.

*Eurema conjungens*: Gundlach, 1881, p. 97.

*Eurema priddyi forbesi* Klots, 1929, p. 124, pl. I, f. 4, 5a, 5b.

This species may be distinguished from the other Cuban *Euremas* by the white ground color, suffused with green on the under side of the hindwing (winter form) or with some green spots (summer form). The male usually has a black bar on the inner margin of the forewing above. The only species with which it is liable to be confused is *E. amelia*. In *amelia* there is a black spot at the end of the cell of the forewing above, absent in *lucina*; the cell spot on the under side of this wing is double in *amelia*, a single bar in *lucina*; other differences are pointed out in the key. Length of f.w., 13-17 mm.

The names listed in the synonymy above seem all to apply to this species. The black marginal border of the hindwing may extend to  $Cu_2$  (*fornsi*) or only to  $M_3$  (*lucina*), or it may be intermediate; the hindwing may be completely suffused with greenish yellow beneath (*forbesi*), or it may be white with green patches (*lucina*)—apparently a seasonal

difference, as in the related *daira*. The bar of the male may be well developed, partially developed, or absent (*forbesi*), a condition found also in the Cuban *elathea*. Specimens in the M.C.Z. dated September, December and February correspond closely to *forbesi*; others from the same localities dated April, May and August correspond to *lucina*, with some spring and fall intermediates. The genitalia of several specimens examined seemed to be identical, and to differ constantly from either *daira* or *elathea*.

*Dist.* *E. lucina* is known only from Cuba; the Hispaniolan *priddyi*, with a yellow ground color, may be a choromorph of the same species. In the M.C.Z. there are 18 specimens from Sta. Clara (Soledad), Habana and the Isle of Pines; the U.S.N.M. has specimens from Oriente (Santiago), Habana, Pinar del Rio (paratype of *forbesi*) and the Isle of Pines. The A.M.N.H. paratype of *forbesi* is from the Isle of Pines.

#### 19. EUREMA DAIRA PALMIRA

*Terias elathea*: Poey, 1846, p. 385.

*Terias albula*: Poey, 1846, p. 385; *id.*, 1852, p. 198.

*Terias palmira* Poey, 1852, p. 198; *id.*, 1853, p. 249, pl. 24, f. 4, 5, 6; Herrich-Schäffer, 1864b, p. 165.

*Terias ebriola* Poey, 1853, p. 250, pl. 24, f. 7-13; Herrich-Schäffer, 1864b, p. 165.

*Terias albina* Poey, 1853, p. 251, pl. 24, f. 14, 15, 16.

*Terias cubana* Herrich-Schäffer, 1864b, p. 166.

*Eurema cubana*: Gundlach, 1881, p. 90.

*Eurema palmira*: Gundlach, 1881, p. 92.

*Eurema jucunda*: Gundlach, 1881, p. 94.

*Eurema albina*: Gundlach, 1881, p. 95.

*Eurema palmyra*: Klots, 1929, p. 126, pl. I, f. 11.

*Eurema daira ebriola*: Klots, 1929, p. 126, pl. I, f. 19a, 19b, 20.

The long series of this species in the M.C.Z. shows a nice seasonal correspondence between *palmira*, with the hindwing white below (summer form) and *ebriola*, with this wing suffused with pink or brown (winter form). There is some mixture in November, which is to be expected if the color of the adult is due to the humidity or other factors in the micro-climate of the larva or pupa. *E. elathea* is the only species with which it is liable to be confused. Length of f.w., 13-17 mm.

*Met.* Gundlach found the larva on "amor seco" (*Desmodium*).

*Dist.* This species is said to occur almost everywhere in tropical America, but the choromorph *palmira* may be limited to Cuba.

Specimens from Hispaniola in the M.C.Z. differ only slightly from the Cuban ones; I have seen no Jamaican specimens. There are 359 specimens in the M.C.Z. from Oriente, Sta. Clara (Soledad) and Habana. The U.S.N.M. specimens are from Oriente, Matanzas and the Isle of Pines.

## 20. EUREMA ELATHEA

*Papilio elathea* Cramer, Pap. Ex., 2, pl. 99, f. C, D. (1777).

*Terias elathea*: Herrich-Schäffer, 1864b, p. 166; Holland, 1916, p. 499.

*Eurema elathea*: Gundlach, 1881, p. 91; Klots, 1929, p. 128, pl. 1, f. 21, 22a, 22b.

There is considerable confusion in the application of this name, so that it is difficult to be sure of the synonymy. In the male sex, it is easily distinguished from *palmira* by the pure black of the bar on the inner margin of the forewing, which includes at most only a few grey hairs at the base. This bar may be very well developed, reduced, or absent, while in the several hundred males of *palmira* examined it is always present. The females are more difficult to distinguish. The apical black patch of the forewing extends to the outer angle in *elathea*, whereas in *palmira* it is abruptly cut off at vein  $Cu_2$ ; the marginal border of the hindwing is also more complete in *elathea*. The few dated Cuban specimens that I have seen were caught in December and February. The December males have the under side of the hindwing irrorated with brown scales, while the February ones are almost white. Length of f.w., 13-16 mm.

*Dist.* The A.N.S.P. has ten specimens of this species from Oriente (Guantanamo), which they kindly lent me for study. Jamaican specimens are more common in collections. The species ranges widely in tropical America, but Klots (1929) found that it had not formed any well-marked geographical varieties.

## 21. EUREMA MESSALINA MESSALINA

*Papilio messalina* Fabricius, 1787, p. 22.

*Terias bulaca*: Poey, 1853, p. 253; Herrich-Schäffer, 1864b, p. 168.

*Terias iradia* Poey, 1853, [p. 253], pl. 18, f. 14-17 [1852].

*Terias gnathene*: Lucas, 1857, p. 512, pl. 16, f. 3, 3a.

*Eurema messalina*: Gundlach, 1881, p. 98; Klots, 1929, p. 131, pl. 2, f. 41, 42a, 42b.

The sexes of this little insect are very different. The male is pure white above, except for the black border; the hindwing below is more



yellowish, as is the forewing along the costa and at the apex. There are some traces of pink on the hindwing below. The female has only the apex of the forewing and a spot on the outer margin of the hindwing black above; below, the large pink spot on the hindwing is very characteristic. The species shows an astonishing variation in size, the length of the forewing varying from 10 to 18 mm. in our series.

*Met.* The larva is similar to that of *palmira*, and lives on the same plant (*Desmodium*), according to Gundlach.

*Dist.* This species is said to occur in the West Indies, Yucatan and Florida. The Bahaman race, characterized by the reduced markings of the female, was named *blakei* by Maynard; the species seems to be quite constant on the other islands. In the M.C.Z. there are 78 specimens from Oriente, Sta. Clara (Soledad) and Habana.

## 22. EUREMA NICIPPE

*Papilio nicippe* Cramer, Pap. Ex., 3, p. 31, pl. 210, f. C, D, (1779).

*Terias nicippe*: Poey, 1846, p. 383; *id.*, 1853, p. 245; Herrich-Schäffer, 1864b, p. 165; Röber in Seitz, V, p. 81, pl. 24a (1910); Holland, 1916, p. 498.

*Eurema nicippe*: Gundlach, 1881, p. 82; Klots, 1929, p. 132, pl. 2, f. 36a, 36b, 37; Holland, 1931, p. 301, pl. 37, f. 3-6.

The upper side is orange, broadly bordered with black on both wings. In the female, the orange of the discal area encroaches on the border of the hindwing, making its inner edge indefinite. The under side is lighter, marked with brown on the hindwing. There is a dark spot at the end of the cell of the forewing on both surfaces. Length of f.w., 18-25 mm.

*Met.* The larva, which lives on *Cassia*, has often been described.

*Dist.* This is a very common insect over much of the middle American region, occurring quite far north in the United States. In the M.C.Z. there are 76 specimens from Oriente, Sta. Clara (Soledad) and Habana. Specimens from Jamaica and Hispaniola do not seem to differ from those found in Cuba and the United States.

## 23. EUREMA BOISDUVALIANA

*Terias boisduvaliana* Felder & Felder, Reise Nov., p. 200 (1867).

*Eurema boisduvaliana*: Klots, 1929, p. 133, pl. 2, f. 51, 52.

This is a Central American species, not previously reported from Cuba. The ground color is yellow, with a heavy black border on both

wings in the male, limited to the apex of the forewing and absent or only partially developed on the hindwing in the female. The under side is almost immaculate yellow in all of our Cuban specimens. Length of f.w., 17-21 mm.

*Dist.* In the M.C.Z. there are 15 specimens from the vicinity of Central Soledad (Santa Clara).

#### 24. EUREMA AMELIA

*Terias amelia* Poey, 1853, p. 253, pl. 18, f. 11, 12, 13, [1852]; Herrich-Schäffer, 1864b, p. 168; Holland, 1916, p. 499.

*Eurema amelia*: Gundlach, 1881, p. 98; Klots, 1929, p. 136, pl. 2, f. 33.

The ground color of both wings is white. There is a rather heavy black apical patch on the forewing, that extends along the outer margin to the inner angle. The outer margin of the hindwing is completely but narrowly bordered with black in the male, but not in the female. Below, the costal and apical areas of the forewing and the entire hindwing are yellowish, with scattered dark scales. Length of f.w., 14 mm.

*Dist.* This species, known only from Cuba, was found in the savannahs near the Cienaga de Zapata (Sta. Clara) by Gundlach. The U.S.N.M. has a short series from the Isle of Pines and Pinar del Rio; Dr. Schaus kindly gave two of these specimens to the M.C.Z.

#### 25. EUREMA PROTERPIA PROTERPIA

##### Fig. 6, venation

*Papilio proterpia* Fabricius, 1775, p. 478.

*Terias proterpia*: Poey, 1846, p. 384; *id.*, 1853, p. 245; Herrich-Schäffer, 1864b, p. 165; Röber in Seitz, V, p. 81, pl. 24a, (1910).

*Eurema proterpia*: Gundlach, 1881, p. 84; Klots, 1929, p. 137, pl. 3, f. 68, 69; Holland, 1931, p. 301, pl. 37, f. 2.

This species is very similar to the following one; it may be distinguished by the character used in the key, and by the fact that the hindwing is very strongly angled between veins  $Cu_1$  and  $M_3$ , but not tailed, as in *gundlachia*. The sexes are somewhat different: the ground color is deeper orange in the male than in the female, the black border at the apex of the forewing above is more rounded within, and so forth. The ends of the veins are often outlined in black, especially in the male. Length of f.w., 2-25 mm.

*Dist.* Klots (1929) recognized only two choromorphs in this species: the typical form ranging widely over Middle America, and the subspecies *watsonia* from Ecuador. The type locality of *proterpia* is Jamaica. In the M.C.Z. there are 24 specimens from Oriente and Sta. Clara (Soledad).

## 26. EUREMA GUNDLACHIA

*Terias gundlachia* Poey, 1853, p. 246, pl. 24, f. 1, 2, 3; Herrich-Schäffer, 1864b, p. 165; Röber in Seitz, V, p. 81, pl. 24a (1910).

*Eurema gundlachia*: Gundlach, 1881, p. 85; Klots, 1929, p. 137, pl. 3, f. 72, 73; Holland, 1931, p. 300, pl. 73, f. 25.

This species is very similar to *proterpia*, but with the hindwing prominently toothed between  $Cu_2$  and  $M_3$ , the veins not so extensively outlined in black above, and the under side of the hindwing heavily reticulated with reddish and brown lines and spots. Length of f.w., 22-23 mm.

*Dist.* The range of this form coincides, apparently, with that of *proterpia*, and I suspect that it is only a well marked phenotypic variety of that species. There are three specimens in the M.C.Z. from Oriente (Sierra Maestra, 1000 ft., Querci) and "Cuba;" Gundlach reports it from "western Cuba."

## 27. EUREMA NISE

*Papilio nise* Cramer, Pap. Ex., 1, p. 31, pl. 20, f. K, L. (1775).

*Eurema nise perimede*: Klots, 1929, p. 140, pl. 4, f. 92b, 93a, 93b, 94.

This Central American species, like *boisduvaliana*, seems not previously to have been reported from Cuba. We found it to be rather abundant in the vicinity of Central Soledad, flying in company with the similar *E. lisa*. It is not likely to be confused with any other Cuban species unless it be *lisa*, from which it may be separated by the yellow fringe of the wings, and the reduced markings of the hindwing below—clear yellow in the male, marked lightly with brown in the female. Length of f.w., 14-18 mm.

*Dist.* This species ranges widely in tropical America, and Klots (1929) found that it had formed several geographical races. The nomenclature that he used for these forms, however, seems very uncertain, and with only limited material for comparison, I have been unable to check his arrangement. He applies, for instance, the name

*perimede*, based on a Brazilian specimen, to the Central American choromorph! Cramer's *nise* is said to have come from Jamaica, but as no such form is now known from that island, the type locality of the name must be considered doubtful. Godman and Salvin (*Biologia*, 2, p. 165) rejected the name *nise* entirely, and called this species *Terias tenella* Boisduval: also a Brazilian name. Cuban specimens seem to be identical with specimens from Honduras. In the M.C.Z. there are 15 specimens from Sta. Clara (Soledad); the A.M.N.H. has a specimen from Habana.

## 28. EUREMA LISA

Fig. 7, profile of head

*Xanthidia lisa* Boisduval & Leconte, 1833, p. 53, pl. 19, f. 4, 5.

*Terias sulphurina* Poey, 1853, p. 248, pl. 18, f. 1, 2, 3, [1852].

*Terias lisa sulphurina*: Herrich-Schäffer, 1864b, p. 168.

*Eurema lisa*: Gundlach, 1881, p. 89; Klots, 1929, p. 138, pl. 3, f. 74, 75; Holland, 1931, p. 302, pl. 37, f. 13.

*Terias lisa*: Röber in Seitz, V, p. 83, pl. 24d (1910).

*Terias euterpe*: Holland, 1916, p. 499.

The females of this species are much lighter than the males, often quite white, and they have the marginal band of the hindwing less completely developed. The pink spot on the under side of the hindwing, between veins R and M<sub>1</sub> is characteristic. Length of f.w., 12-17 mm.

*Met.* The larva has often been described by entomologists in the United States; it lives on various species of *Cassia*.

*Dist.* *E. lisa* has a wide range in North and Middle America, but it seems not to have formed distinct choromorphs. In the M.C.Z. there are 256 specimens from Oriente, Sta. Clara (Soledad) and Habana.

## 29. EUREMA DINA DINA

*Terias dina* Poey, 1832, no. 11, 2 figs.; *id.*, 1846, p. 384; *id.*, 1852, p. 197; *id.*, 1853, p. 247; Herrich-Schäffer, 1864b, p. 167; Holland, 1916, p. 498.

*Terias citrina* Poey, 1853, p. 247, pl. 18, f. 4-7, [1852]; Herrich-Schäffer, 1864b, p. 167; Holland, 1916, p. 498.

*Terias larae* Herrich-Schäffer, 1862, p. 120; *id.*, 1864b, p. 167.

*Eurema dina*: Gundlach, 1881, p. 86; Klots, 1929, p. 139, pl. 3, f. 79, 80.

*Eurema citrina*: Gundlach, 1881, p. 87.

*Eurema larae*: Gundlach, 1881, p. 88.

The forewing above varies from yellow to orange, margined completely, but rather narrowly, with black; the hindwing is orange, or yellow tending to orange on the outer margin, with a fine black border that may be reduced or absent. The wings beneath are yellow, with a small black discal dot on the forewing, and with two such dots on the hindwing. Length of f.w., 18-23 mm.

*Dist.* This species is made up of several choromorphs, and the complex thus formed has a wide range in tropical America. *Dina*, *s.s.* seems to be limited to Cuba and Hispaniola. In the M.C.Z. there are 94 specimens from Oriente, Sta. Clara (Soledad) and Habana. The U.S.N.M. specimens are from Oriente and Pinar del Rio.

## Genus VI. PHOEBIS Hübner

Genotype, *Papilio argante* Fabricius.

Forbes (1927) has recently published a key to the American species of *Phoebis* (*Catopsilia*), and Brown (1929, 1931) has reviewed the group in some detail, basing his study largely on the male genitalia. Klots (1933, p. 181) is probably correct, from the phylogenetic point of view, in separating the American forms, as *Phoebis*, from the Old World *Catopsilias*; further subdivision, however, seems unwarranted.

The nomenclature and classification of the forms of this group have long been very confused. No recent student of the genus has attempted to unravel the complicated bibliographies of the various species, and none has made a thorough study of type specimens. The sexual and individual dimorphism of many species has made their study difficult, and has overshadowed the more important problem, from our point of view, of geographical variation. It has, as a result, been very difficult to be sure of the nomenclature of the Cuban forms, and the names adopted here are very uncertain in several cases.

It is possible that some form of *P. editha* or of *P. trite* will be found in Cuba, in addition to the species listed here. For a discussion of the Hispaniolan *P. editha* see the paper by Brown (1933, p. 3).

### *Key to species*

1. F.w. above with a black or dark brown spot at the end of the cell (usually females) . . . . . 7
- No such spot (males) . . . . . 2

2. Wings above entirely yellow; marked below with a few fine brown spots and lines . . . . . 30. *P. sennae* ♂  
Wings orange or yellow and white, or if yellow, with the under side immaculate . . . . . 3
3. Wings above orange . . . . . 4  
Wings above white or yellow, in part at least . . . . . 5
4. The reddish bar on the under side of f.w., which extends from about vein  $Cu_2$  to  $R_4$  is entire, straight . . . . . 34. *P. agarithe* ♂  
This bar is interrupted in the middle, becoming a somewhat zig-zag series of spots . . . . . 33. *P. argante* ♂
5. Base of f.w. with a large round orange spot, surrounded by some yellow; outer half of wing white . . . . . 37. *P. orbis* ♂  
Base of f.w. lemon yellow above, not marked with orange . . . . . 6
6. Mealy border on outer half of wings above white, or at least contrasting with the yellow basal area; this outer mealy area enters, or touches, the tip of the cell of f.w. . . . . 35. *P. statira* ♂  
Mealy border of wings yellow, like the basal area; this border lies entirely outside of the cell of f.w. . . . . 36. *P. neleis* ♂
7. Disc of f.w. above with a large contrasting patch of color, orange or red, which extends from the inner margin into the cell . . . . 8  
No such area . . . . . 9
8. Patch on f.w. red; h.w. extensively shaded with red.  
32. *P. avellaneda* ♂  
This patch orange, as is the shading on h.w. . . . . 31. *P. philea* ♂
9. Postmedian row of spots on under side of f.w. not distinct below  $Cu_1$ , never extending below  $Cu_2$  . . . . . 10  
One spot at least of this row below  $Cu_2$  . . . . . 12
10. Ground color of wings above orange . . . . . 37. *P. orbis* ♀  
Ground color light yellow, or almost white . . . . . 11
11. Outer margin of f.w. above with a narrow black border.  
35. *P. statira* ♀  
This border represented only by small, disconnected spots.  
36. *P. neleis* ♀
12. Large species (f.w. usually more than 40 mm. long), with a complete row of postmedian spots on f.w. above . . . . . 13  
Smaller species (f.w. usually less than 35 mm. long), with the postmedian spots either absent above, obsolescent, or not distinct below  $Cu_1$  . . . . . 14



13. Under side of h.w. heavily dusted with reddish, with almost no pattern apparent .....32. *P. avellameda* ♀  
 Under surface of h.w. deep yellow, with a heavy purplish border and some purple spots.....31. *P. philea* ♀
14. Postmedian row of spots on f.w. below forming an even line from the inner margin toward the apex (as couplet 4).  
 34. *P. agarithe* ♀  
 This line of spots interrupted, zig-zag .....15
15. The postmedian spots of f.w. above remain distinct from the dark border of the apex of the wing.....30. *P. sennae* ♀  
 These spots merge with a dark patch at the apex of the wing.  
 33. *P. argante* ♀

## 30. PHOEBIS SENNAE SENNAE

*Papilio sennae* Linnaeus, 1758, p. 470.

*Callidryas eubule*: Poey, 1846, p. 300; Herrich-Schäffer, 1864b, p. 169; Holland, 1931, p. 289, pl. 33, f. 2, 3.

*Catopsilia eubule*: Gundlach, 1881, p. 115; Röber in Seitz, V, p. 85, pl. 25a; Holland, 1916, p. 496.

*Phoebis eubule sennae*: Brown, 1929, p. 7, f. 8-10 (genit.).

*Phoebis eubule sennae* f. ♀ *sennalba* Brown, 1929, p. 8.

This is an exceedingly common insect in Cuba. It is very variable in the female sex, but the character given in the key (couplet 15) seems always to distinguish it from related species. Length of f.w., 30-35 mm.

*Met.* The larva, often described, lives on various species of *Cassia*.

*Dist.* Brown (1929) recognized four choromorphs in this species: *eubule* from the United States; *sennae* from the West Indies, *marecellina* from the tropical mainland, and *amphitrite* from the South Temperate region. He stated (p. 7) that "Linnaeus' type [of *sennae*] was from Jamaica," and we may consider this as a type restriction. Linnaeus included three references under *sennae*, one to Sloan, one to Ray and one to Merian. Both the Sloan and Ray references are to Jamaica, so that by precedence, majority rule, or type restriction, Jamaica wins as the type locality. The name *sennae* has several years priority over *eubule* (*Papilio eubule* Linn., 1767, p. 764), so that it must form the species name.

There are 76 specimens in the M.C.Z. from Oriente, Camagüey, Sta. Clara (Soledad) and Habana.

## 31. PHOEBIS PHILEA THALESTRIS

*Papilio Danaus Thalestris* Illiger, 1801, p. 207

*Colias thalestris*: Hübner, Ex. Schm., 2, pl. 133, f. 1, 2.

*Callidryas thalestris*: Poey, 1846, p. 299; Herrich-Schäffer, 1864b, p. 169;

Butler, Lep. Ex., p. 93, pl. 35, f. 5-8 (1872).

*Catopsilia thalestris*: Gundlach, 1881, p. 107; *id.*, 1891, p. 449.

*Catopsilia philea thalestris*: Röber in Seitz, V, p. 86 (1910).

*Phoebis philea thalestris*: Brown, 1929, p. 11.

The male is yellow above, with a black spot at the end of the cell of the forewing, and with a large orange patch over the discal area; the hindwing is yellow, washed with orange on the outer margin. The female is a very different looking insect: dull orange, dusted with reddish above, and with heavy brown markings. Length of f.w., 42-48 mm.

*Met.* Gundlach described the early stages of this species in some detail. He found the larva on "Guacamaya colorada" (*Poinciana pulcherrima*), "Caña fistola" (*Cassia fistula, grandis*) and "Yerba hedi-onda" (*Cassia occidentalis*).

*Dist.* *P. philea* ranges widely in tropical America, but the choromorph *thalestris* is limited to Cuba and Hispaniola. There are only two specimens from Cuba in the M.C.Z., both from Oriente (Sierra Maestra, 1000 ft., Querci; "Cuba, Wright"). The U.S.N.M. has nine specimens from Oriente (Tagua, Alto del Cedro).

## 32. PHOEBIS AVELLANEDA

*Callidryas thalestris* var.: Herrich-Schäffer, 1862, p. 119.

*Callidryas avellaneda* Herrich-Schäffer, 1864b, p. 169; Butler, Lep. Ex., p. 95, pl. 36, f. 3, 4, 5 (1872).

*Callidryas solstitia* Butler, 1869b, p. 203; *id.*, Lep. Ex., p. 95, pl. 36, f. 1, 2.

*Catopsilia avellaneda*: Gundlach, 1881, p. 109; Röber in Seitz, V, p. 86, pl. 25d (1910).

*Phoebis avellaneda*: Brown, 1929, p. 11, f. 17-19 (genit.).

The bright red of the male of this species will distinguish it from any other American Pierid. The female is quite similar to that of *thalestris*, and the two may be most easily separated by the character used in the key. Length of f.w., 40-45 mm.

*Dist.* This species is known only from Cuba and Hispaniola. There are three males in the M.C.Z. from Oriente (Santiago de Cuba) and

Sta. Clara (Soledad). The U.S.N.M. has a beautiful series from Santiago de Cuba.

### 33. PHOEBIS ARGANTE RORATA

*Callidryas argante*: Herrich-Schäffer, 1864b, p. 169.

*Callidryas rorata* Butler, 1869b, p. 202; *id.*, Lep. Ex., p. 118, pl. 44, f. 5-8 (1872).

*Callidryas minuscula* Butler, 1869c, p. 16; Lep. Ex., p. 120, pl. 44, f. 9, 10, 10a (1872).

*Callidryas fornax* Butler, 1871, p. 170; *id.*, Lep. Ex., p. 105, pl. 39, f. 5, 6 (1872).

*Catopsilia argante*: Gundlach, 1881, p. 111.

*Phoebis argante rorata*: Brown, 1929, p. 12.

*Phoebis argante rorata* form ♀ *adela* Brown, 1929, p. 13.

The male is similar to the male of *agarithe*; it is most easily distinguished by the interrupted course of the postmedian spots, described in the key. The female is rather variable, often very heavily marked. Length of f.w., 32-35 mm.

*Met.* Gundlach mentions that the larva feeds on various Caesalpineae, but he does not describe it.

*Dist.* Brown recognized two choromorphs of this species: the typical *argante* found almost everywhere on the tropical mainland, and *rorata*, known only from Cuba and Hispaniola. The only Cuban specimen in the M.C.Z. is a light-colored female from Oriente ("Cuba, Wright"). The U.S.N.M. specimens are from Matanzas and Oriente (Alto del Cedro). There is a very interesting female of this form in the Cornell University Collection, labelled "Cuba," with the outer half of the hindwing above brick-red, almost exactly like Butler's figure of *fornax*.

### 34. PHOEBIS AGARITHE AGARITHE

*Colias agarithe* Boisduval, 1836, p. 623.

*Callidryas agarithe*: Poey, 1846, p. 301; Lucas, 1857, p. 496, pl. 15, f. 4b, 4c (*part.*); Herrich-Schäffer, 1864b, p. 169; Butler, Lep. Ex., p. 121, pl. 45, f. 1-4 (1873); Holland, 1931, p. 289, pl. 33, f. 1, pl. 67, f. 19.

*Catopsilia agarithe*: Gundlach, 1881, p. 111.

?*Catopsilia agarithe fornax*: Holland, 1916, p. 497.

*Phoebis agarithe antillia* Brown, 1929, p. 15.

The male is a uniform bright orange above, somewhat lighter below, with various fine reddish-brown markings. The female is sometimes

quite similar to the male, sometimes lighter colored with heavier markings. The submedian spots of the forewing on the under side form a straight line in both sexes. Length of f.w., 32-35 mm.

*Mct.* The larva has been found on *Pithecolobium guadaloupensis* in Florida.

*Dist.* This species is found in all parts of Middle America, but it is usually common only near the coast, where its food plant grows. I have been unable to distinguish the choromorphs separated by Brown (1929), but as the series in the M.C.Z. includes only about 50 specimens, with many localities quite unrepresented, it is very possible that I have been misled. A short series from Lower California seems to represent a homogeneous and distinct race; otherwise I cannot separate Central American and West Indian specimens. Brown stated that "the race *antillia* is characterized by a great amount of Indian-red scaling on the under surface." I find that our Antillean specimens (Jamaica, Bahamas, Cuba) are generally more lightly marked than continental ones; sometimes they are almost immaculate. The difference may be seasonal, as most of our specimens were taken in the summer, while Brown's types were dated February and April. The name *agarithe*, which Brown applies to the "South American race," was based on Mexican specimens.

There is only a single pair of this species from Cuba in the M.C.Z.: from Santa Clara (Cienfuegos Bay, June, August.)

### 35. PHOEBIS STATIRA JADA

*Callidryas evadne*: Boisduval, 1836, p. 628 (*part.*).

*Callidryas alcmeone*: Poey, 1846, p. 300; *id.*, 1852, p. 197.

*Callidryas jada* Butler, 1870, p. 11.

*Catopsilia statira*: Gundlach, 1881, p. 118; *id.*, 1891, p. 449.

*Catopsilia neleis*: Holland, 1916, p. 497.

*Aphrissa statira neleis*: Brown, 1931, p. 9, f. 10-12 (*genit.*).

Probably the best way to collect this and the following species is to take all specimens of *sennae* seen, and examine them carefully before discarding them. The male is at once distinguishable by the light outer half of the wings above, covered with modified scales. The female is, however, apt to be confused with lightly marked females of *sennae* in the field. Probably it can be most quickly distinguished by a glance at the palpi, which have an elongate terminal joint in this (and the following ?) species, very different from the small knob found on *sennae* females. Length of f.w., 25-30 mm.

*Mct.* Gundlach (1891) found the larva on "Guacamaya cimarrona," a species of *Cassia*.

*Dist.* *P. statira* ranges widely in the American tropics, and it is sufficiently variable to have accumulated an impressive synonymy. The Cuban form was separated by Brown (*l.c.*) largely on characters of the female, but as he did not recognize the true *neleis*, I suspect that his series of *statira* females was mixed. The M.C.Z. material is inadequate for a thorough study of the question, but I can find no characters by which our Cuban males or females can be separated from specimens from Honduras, Guatemala or Mexico. South American specimens, and the few specimens that we have from Central America south of Honduras, seem distinct, with a narrow black border on the forewing of the male, heavier markings on the female, and so forth. The only Florida specimen that I have seen is larger and yellower than our Cuban males. It has seemed to me best, then, to separate specimens from northern Central America and Cuba as *jada* Butler, using the oldest name available for this area. The name *zulema* Poey (1852, p. 198) is not available for the Cuban form, as it was published as a possible substitute name for *alcmeone* Fabricius, and is thus an absolute synonym of *evadne*, which in turn is a synonym of the South American *statira*. The choromorphs found on Hispaniola and Jamaica are quite distinct.

In the M.C.Z. there are six males and two females from Oriente, Sta. Clara (Soledad) and Habana.

### 36. PHOEBIS NELEIS

*Callidryas neleis* Boisduval, 1836, p. 629; Poey, 1846, p. 301; Lucas, 1857, p. 498, pl. 15, f. 5, 5a, 5b, 5c; Herrich-Schäffer, 1864b, p. 169; Butler, Lep. Ex., p. 145, pl. 52, f. 1-4 (1873).

*Catopsilia neleis*: Gundlach, 1881, p. 117.

?*Callidryas editha*: Holland, 1916, p. 498.

?*Callidryas statira neleis* f. ♀ *poeyae* Brown, 1931, p. 10.

The male of this species is larger than that of *C. statira*, and has the mealy outer half of the wings above yellow, like the ground color. I have not seen the female, but according to Gundlach, it may be distinguished by the character used in the key (reduced markings of forewing above), by the deeper yellow ground color, both above and on the under side of the hindwing, and by the fact that the under side of the forewing becomes slightly darker toward the inner margin, while it becomes lighter in *statira*. Length of f.w., 35 mm.

*Dist.* This species is known only from Cuba. The male genitalia are quite distinct from those of any other species known to me, but they show the same general structure as those of *godartiana*, judging by Brown's figures (1931, f. 4-6). The female form *poeyae* described by Brown may be this species.

There is one male in the M.C.Z. from Oriente ("Cuba, Wright") and I noticed several specimens in the A.N.S.P. from Guantanamo that may belong to this species.

### 37. PHOEBIS ORBIS

*Callidryas orbis* Poey, 1832, no. 1, 5 figs.; *id.*, 1846, p. 300; *id.*, 1852, p. 196;

Butler, Lep. Ex., p. 153, pl. 55, f. 1-4 (1873).

*Callidryas godartiana*: Herrich-Schäffer, 1864b, p. 169.

*Catopsilia orbis*: Gundlach, 1881, p. 113; Röber in Seitz, V, p. 88, pl. 26a (1910).

*Catopsilia drya*: Holland, 1916, p. 497.

*Aphrissa orbis*: Brown, 1931, p. 4.

This species has been so often bred that there can no longer be any doubt as to the correct association of the sexes. The male is unique in having a curious orange disc at the base of the forewing above. The female is a uniform light orange, with the forewing rather heavily bordered with brown; it may be distinguished from its allies by the various characters given in the key. Length of f.w., 26-35 mm.

*Mct.* The larva lives on "Guacamaya colorado" (*Poinciana pulcherrima*) according to Gundlach.

*Dist.* This species is known only from Cuba and Hispaniola. In the M.C.Z. there are 16 specimens from Oriente, Camagüey and Habana, many of them bred from *Poinciana*.

### Genus VII. ANTEOS Hübner

Genotype, *Papilio maerula* Fabricius.

The two Cuban species may be distinguished thus:

1. Upper surface lemon yellow.....38. *A. maerula*  
     Upper surface white, with a yellow or orange patch over the cell  
     of f.w.....39. *A. clorinde*



## 38. ANTEOS MAERULA MAERULA

*Papilio maerula* Fabricius, 1775, p. 479.

*Gonepteryx maerula*: Herrich-Schäffer, 1862, p. 120; *id.*, 1864b, p. 169; Gundlach, 1881, p. 119; Röber in Seitz, V, p. 89, pl. 24g (1910).

*Anteos maerula*: Klots, 1929b, p. 140.

The upper surface of this species is a uniform lemon yellow, except for a black spot at the end of the cell of the forewing, and a similar, light brown, spot on the hindwing. The under side is faintly reticulated with yellow on a lighter background. The sexes are very similar. Length of f.w., 40-48 mm.

*Met.* Gundlach bred this species from a *Cassia* known as "Frijol de Gallina" in Santiago de Cuba.

*Dist.* Fabricius described this species from "America, mus. Hunter." As the Hunter collection included material from Jamaica, where this butterfly has long been known, we may provisionally consider that island as the type locality. The species has a wide range, and shows both individual and geographical variation in the shape of the wings, development of discal spots, ground color, reticulation of under surface, and so forth. The series in the M.C.Z. is too short to permit a careful analysis of this variation, but it would seem that the form *lacordairei* Boisduval from northern Central America is a good choromorph. Cuban specimens are very like those from Nicaragua, and it is probable that Jamaican and Hispaniolan specimens will be found to be similar.

In the M.C.Z. there are 5 specimens from Oriente (Sierra Maestra, 1000 ft., Querci).

## 39. ANTEOS CLORINDE NIVIFERA

*Rhodocera clorinde nivifera* Fruhstorfer, 1907, p. 294.

*Gonepteryx clorinde*: Röber in Seitz, V, p. 89, pl. 24g; Holland, 1931, p. 290, pl. 71, f. 11.

*Anteos clorinde*: Klots, 1929b, p. 140.

This species seems not to have been reported from Cuba previously. Fairchild and I found it to be quite common in the vicinity of Soledad, where it was breeding on a large species of *Cassia* growing in waste places. It is a striking butterfly, white above, with a bright orange

patch over the end of the cell of the forewing in the male. In the female this patch is yellow and more diffuse, almost disappearing in some specimens. Length of f.w., 40–47 mm.

*Dist.* Godart described *clorinde* from Brazil (1819, p. 813); he stated that the cell patch of the male was "lemon yellow," and Godman and Salvin (*Biologia*, II, p. 149) remark that all South American specimens, almost without exception, have the orange spot of the forewing of a rather more lemon tint than Central American specimens. Cuban specimens seem not to differ from Central American ones, and consequently, although I have not been able to examine Brazilian males, I have used Fruhstorfer's name *nivifera*, which was based on specimens from Honduras.

In the M.C.Z. there are 9 specimens from Sta. Clara (Soledad).

### Genus VIII. KRICOGONIA Reakirt

Genotype, *Colias lyside* Godart.

Specimens of this genus seem to be rather rare in collections, and many forms have been described the exact status of which is not known. Our longest series is from Texas and Arizona, and includes specimens that will fit almost any of the names so far proposed. The oldest name is *Papilio castalia* Fabricius (1793, p. 188), based on an unpublished Jones drawing; this has no locality, but the specimen presumably came from Jamaica. The next name, *lyside*, was also published without locality; the description fits Hispaniolan specimens, and as Godart received many butterflies from that island, it may provisionally be considered as the type locality. Our specimens from Hispaniola are similar to our Jamaican specimens, in that both lack the black bar on the hindwing above, but Geyer in Hübner (*Zuträge*, 5th Hundred, p. 13, f. 843, 844) figures a banded form from Port-au-Prince. The nomenclature and relationships of these various forms cannot be settled without a great deal of material from many localities. Two Cuban forms seem distinct enough to be called "species." They may be separated thus:

1. Under surface of h.w. with a reticulate pattern of somewhat greenish scales on an ivory ground color . . . . . 41. *K. cabrerai*  
This wing uniform lemon yellow, or sometimes with silvery patches.  
40. *K. lyside*

40. *KRICOGONIA* *LYSIDE*

*Colias lyside* Godart, 1819, p. 98.

*Callidryas lyside*: Poey, 1854b, p. 442, pl. 15, f. 5, 6, 7.

*Gonopteryx lyside*: Herrich-Schäffer, 1864b, p. 169.

*Kricogonia lyside*: Gundlach, 1881, p. 120; Röber in Seitz, V, p. 89 (1910).

The ground color varies from white to greenish yellow; the base of the forewing may be a contrasting orange or concolorous with the rest of the wing; there may or may not be a black bar on the hindwing above perpendicular to the costa. Length of f.w., 21 mm. (this may vary considerably).

*Dist.* The only specimen in the M.C.Z. (labelled "Cuba, Wright") is similar to Bahaman specimens, which seem to be uniformly smaller than those from Hispaniola and Jamaica. From the account of Gundlach, however, it would seem that the Cuban form is very variable; he states that it is not uncommon in the neighborhood of the coast.

41. *KRICOGONIA* *CABRERAI*

*Kricogonia cabrerai* Ramsden, 1920, p. 259.

"This form is larger than any I have seen from any other locality. It differs from *terissa* [*lyside*], on the upperside, in having the black band longer and wider, extending in this form nearly to the middle of the wing, while in *terissa* it hardly extends to more than a quarter. The base of the primaries is not orange as in *terissa* and differs on the underside, by the marbled appearance of the secondaries." Length of f.w., 27 mm.

*Dist.* I have seen only the types, from Guantanamo (Oriente) in the A.N.S.P., and a male from Santiago de Cuba in the U.S.N.M.

Genus IX. *ZERENE* Hübner

Genotype, *Papilio cesonia* Stoll.

42. *ZERENE* *CESONIA* *CESONIA*

*Papilio cesonia* Stoll, 1790, p. 176, pl. 41, f. 2, 2b.

*Colias cesonia*: Poey, 1846, p. 302.

*Colias caesonia*: Herrich-Schäffer, 1864b, p. 169.

*Meganostoma caesonia*: Gundlach, 1881, p. 105; Röber in Seitz, V, p. 94, pl. 26f (1910).

*Zerene caesonia*: Holland, 1931, p. 292, pl. 36, f. 3, 4.

The "dog-face" pattern of the upper side of the forewings of this species—formed by the heavy black border, dark base, and prominent discocellular spot—is characteristic. Cuban specimens seem to show a wider range of variation than those from the southern United States and Central America, and in one of our specimens the black margin of the forewing has almost disappeared. Length of f.w., 28–32 mm.

*Met.* The larva feeds on *Trifolium* and *Amorpha* in the United States.

*Dist.* This species extends over most of North and Middle America, and along the Andes in South America. It does not seem to have formed any distinct choromorphs north of South America, unless the Hispaniolan *cynops* should prove to deserve that status. In the M.C.Z. there are 8 specimens from Habana; in the U.S.N.M. there is a specimen from Matanzas.

#### Genus X. NATHALIS Boisduval

Genotype, *Nathalis iole* Boisduval.

#### 43. NATHANLIS IOLE

*Nathalis iole* Boisduval, 1836, p. 589; Gundlach, 1881, p. 99; Röber in Seitz, V, p. 95, pl. 27h (1910); Holland, 1931, p. 283, pl. 32, f. 21, 22.

*Nathalis felicia* Poey, 1854b, p. 443, pl. 18, f. 18–21; Herrich-Schäffer, 1864b, p. 168.

The ground color of the male is yellow, of the female darker, tending to orange; the apex of the forewing is broadly black and there is a broad black bar along the inner margin of this wing above, and another, narrower, on the costal margin of the hindwing. Length of f.w., 10–15 mm.

*Dist.* This species ranges over most of Middle America; it was first described from Mexico. Cuban specimens are much more constant in pattern than North American ones, but I can find no difference that would justify the retention of the name *felicia*. There are 104 specimens in the M.C.Z. from Oriente, Sta. Clara (Soledad) and Habana; there are specimens in the U.S.N.M. from Matanzas.

#### Genus XI. DISMORPHIA Hübner

Genotype, *Papilio laia* Cramer.

## 44. DISMORPHIA CUBANA

Fig. 8, venation

*Leptalis cubana* Herrich-Schäffer, 1862, p. 120.

*Dismorphia cubana*: Gundlach, 1881, p. 81; Röber in Seitz, V, p. 102, pl. 30b; Talbot, 1932, p. 18.

The forewing of the male is dark brown, with three yellow spots and a yellow bar on the apex, and an orange bar along the inner margin;

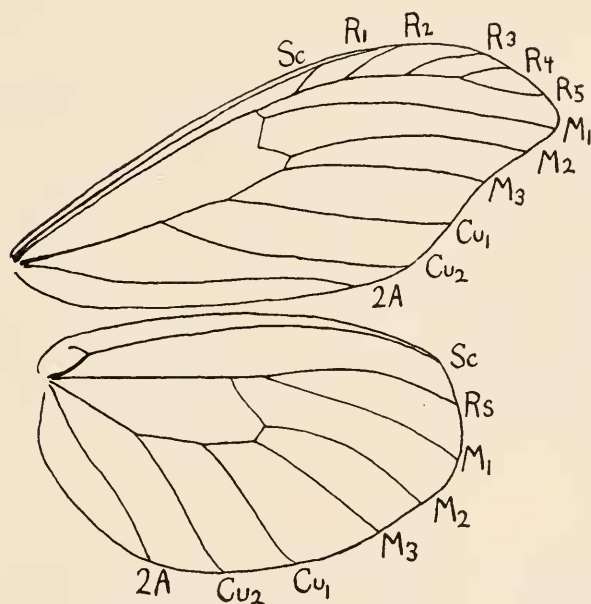


Fig. 8. *Dismorphia cubana*, venation.

the hindwing is orange, edged with dark brown. In the female, all of the markings are yellow. Length of f.w., 30 mm.

*Dist.* This species is known only from Cuba; there is, however, a similar species in Hispaniola. It is limited to the highest mountains, according to Gundlach. In the M.C.Z. there are four specimens from Oriente (Cuba, Wright); the U.S.N.M. has 7 specimens from Oriente (Baracoa, Rio Caño) and Pinar del Rio (San Diego de los Baños).

## Family III. DANAIDAE

This group is sometimes made a subfamily of the Nymphalidae, with which it has much in common. It includes two sections: the first the Danaids proper, tropicopolitan, including only a few genera but many species and choromorphs; the second the Ithomiids, entirely Neotropical, with many genera and species of which only one (*Hymenitis*) reaches Cuba.

## Key to genera

1. Basal joint of palpus elongate, almost as long as the second joint; wings almost entirely transparent. (Fig. 10, venation)

XV. *Hymenitis*

Basal joint of palpus much shorter than second joint; wings fully scaled, brown . . . . . 2

2. Discocellular vein between  $M_3$ - $Cu_1$  of h.w. about as long as that between  $M_2$ - $M_3$ ; f.w. elongate . . . . . XIII. *Lycorea*

Discocellular  $M_3$ - $Cu_1$  of h.w. much shorter than  $M_2$ - $M_3$ ; f.w. of normal shape . . . . . 3

3. Antenna with a distinct, flattened club; under side of f.w. with markings across the cell—fine white or blue lines. (Fig. 9, venation.) . . . . . XIV. *Anelia*

Antenna thickening gradually to tip, not flattened; cell of f.w. on under side uniform brown, except for peripheral spots and shadings . . . . . XII. *Danaus*

## Genus XII. DANAUS Kluk

Genotype, *Papilio plexippus* Linnaeus.

This generic name is used here on the authority of Hemming (1933, p. 222), as I have not seen the 1802 paper by Kluk in which it is supposed to have been published. If the Kluk reference, certainly very obscure, proves to be unavailable, the name *Danaida*, proposed by Latreille, must be used for the genus. It seems to me impossible to date the name *Danaus* from Linnaeus, who used it in the plural form *Danai* (see Scudder, 1875, p. 93).

It is quite possible that *D. erippus* or *D. cleophile* will eventually be found in Cuba; the first is very like *plexippus*, but without the black bar on the inner margin of the forewing, the second may be distinguished by the yellowish apical spots of the forewing.



*Key to species*

1. Inner margin of f.w. bordered with black . . . . . 45. *D. plexippus*  
This margin brown, concolorous with disc . . . . . 2
2. Veins of under side of h.w. outlined in black, bordered with white;  
no postdiscal row of spots on this wing below . . . 46. *D. berenice*  
Veins of under side of h.w. not bordered with white; a row of large  
whitish postdiscal spots from costa to Cu<sub>2</sub> on this wing below.  
47. *D. cresimus*

45. *DANAUS PLEXIPPUS PLEXIPPUS*

*Papilio plexippus* Linnaeus, 1758, p. 471.

*Papilio archippus* Fabricius, 1793, p. 49.

*Anosia megalippe* Hübner, Ex. Schm., 2, pl. 7, 2 figs, (1819-26).

*Danaïs erippus*: Poey, 1847, p. 175; *id.*, 1852, p. 198; Gundlach, 1881, p. 23.

*Danaïs archippus*: Herrich-Schäffer, 1864b, p. 161; Haensch in Seitz, V, p. 113 (1909).

*Danaïs plexippus*: Holland, 1931, p. 68, pl. 7, f. 1.

*Danaida archippus archippus*: Hulstaert, 1931, p. 21.

The ground color is brown, with both wings completely bordered with black; the veins are outlined by black. The apex of the forewing above is almost entirely black in some specimens, and includes several white spots; the black border of the outer margin of both wings also includes two rows of white spots, sometimes only partly developed. The pattern of the upper surface is repeated on the under side, but the ground color of the hindwing is considerably lighter. Length of f.w., 40-50 mm.

The application of the Linnean name *plexippus* is somewhat uncertain, but it has been used here for this species as the most satisfactory way out of the various difficulties presented by the possible alternative names. Riley (1929, Trans. Ent. Soc. London, 76, p. 454) has discussed the probable significance of *plexippus* at some length.

*Met.* The larva, which is well known, feeds on various species of *Asclepias* (Flor de Calentura).

*Dist.* Cuban specimens of this species, which is almost cosmopolitan, fall within the range of variation shown by the North American population. Specimens from other West Indian islands and from the tropical mainland have been separated as distinct choromorphs. In the M.C.Z. there are 8 specimens from Oriente, Sta. Clara (Soledad) and Habana.

46. *DANAUS GILIPPUS BERENICE*

*Papilio berenice* Cramer, Pap. Ex., 3, p. 22, pl. 205, f. E, F, (1779).

*Danaïs berenice*: Poey, 1847, p. 176; *id.*, 1852, p. 198; Herrich-Schäffer, 1864b, p. 161; Gundlach, 1881, p. 24; Haensch in Seitz, V, p. 114, pl. 31a (1909); Holland, 1931, p. 69, pl. 7, f. 2.

*Anosia berenice*: Holland, 1916, p. 488.

*Danaida berenice berenice*: Hulstaert, 1931, p. 23, pl. 1, f. 1.

This species is dark brown, with the costal and outer margins of the forewing and the outer margin of the hindwing bordered with black, which may include a double row of small white spots, although these are usually absent on the hindwing. There are several white spots at the apex of the forewing, and other spots between veins  $M_3$  and  $Cu_1$ ,  $Cu_1$  and  $Cu_2$ ,  $Cu_2$  and 2A. The under side is similar, except that the veins of the hindwing are outlined in black, edged with white, and that the white spots in the black wing border are usually all present. Length of f.w., 34-44 mm.

*Met.* The larva feeds on *Asclepias*.

*Dist.* This species is found almost everywhere in tropical America, and extends well into the temperate zones. The first described choromorph is South American; *berenice* occurs in the southern United States, Central America and Cuba; distinct choromorphs are found on Hispaniola (*cleothera*) and Jamaica (*jamaicensis*). These forms all show very distinct pattern characters, but in genital structure they are almost identical.

In the M.C.Z. there are 22 specimens from Oriente, Sta. Clara (Soledad) and Habana.

47. *DANAUS ERESIMUS*

*Papilio eresimus* Cramer, Pap. Ex., 2, p. 121, pl. 175, f. G, H (1777).

*Danaïs eresimus*: Haensch in Seitz, V, p. 114, pl. 31b, (1909); Kaye, 1931, p. 532.

This species is very similar to *berenice* on the upper side. It may be easily distinguished, however, by the characters given in the key. Length of f.w., 37-43 mm.

*D. eresimus* is rather rare in collections, despite its wide range; probably it is usually overlooked by collectors because of its resemblance to the common *berenice*. There are two color forms in the Cuban material that I have studied: a dark form, very like *berenice*, which agrees well with the dark Ecuadorean *erginus*, and a lighter form, very like the common Hispaniolan type, described as *Danaïs kaempfferi* by Hall (1925, p. 165). I have seen specimens from Jamaica, Hispaniola,

Martinique, Florida and Cuba, as well as from many localities on the mainland. By a little judicious switching of locality labels, it would be possible to make some fine races; but as the labels stand, and until more material is available, I think it is better to leave all of these forms under one name.

*Dist.* In the M.C.Z. there is a male from Sta. Clara (Soledad), and another from Oriente (Sierra Maestra, 1000 ft.), both very dark. In the U.S.N.M. there is a light colored female from Matanzas. In the A.N.S.P. there are two females and a male from Guantanamo, all very light colored.

### Genus XIII. LYCOREA Doubleday

Genotype, *Lycorea atergatis* Doubleday.

*Lycorella* Hemming, genotype *Heliconia cleobaea* Godart.

Hemming (1933, p. 222) proposed a new name for this genus on the assumption that *Lycorea* Doubleday (1847) was preoccupied by *Lycoria* Meigen (1800). The International Rules (1926, p. 87, Art. 36) seem to me clear on this point: "When once introduced [generic names which differ only in a slight variation in spelling which might cause confusion] are not to be rejected on this account."

### 48. LYCOREA CERES DEMETER

*Heliconia pasinuntia*: Poey, 1847, p. 177.

*Lycorea ceres*: Herrich-Schäffer, 1862, p. 119; *id.*, 1864b, p. 161.

*Lycorea demeter* Felder & Felder, Reise Novara, p. 352 (1867); Gundlach, 1881, p. 19.

*Lycorea ceres demeter*: Haensch in Seitz, V, p. 115 (1909); Hulstaert, 1931, p. 188.

The large size and robust build of this insect will distinguish it from the Cuban *Eueides*, the only other long-winged black and brown butterfly on the island. The forewing is black, with three or four small yellowish apical spots, and a series of large connecting yellow spots across the end of the cell; the base of the cell is brown, and there is a large brown band near the inner margin. The hindwing is brown and black, with a row of tiny submarginal white spots. The under side is similar to the upper. Length of f.w., 48-50 mm.

*Met.* Gundlach found the larva, which he did not describe, on species of "Jagüey" (*Ficus*).

*Dist.* This form is known only from Cuba and Hispaniola; the species is widely distributed on the tropical mainland. Gundlach

states that in Cuba "it inhabits the forests over the whole island, but not in all localities; it is at times common." In the M.C.Z. there are 8 specimens from Oriente ("Cuba, Wright" and Torquino River); the U.S.N.M. specimens are from Baracoa.

#### Genus XIV. *ANELIA* Hübner

Genotype, *Anelia numidia* Hübner.

*Clothilda* Blanchard, genotype *Papilio pantherata* Martyn.

This genus has been generally placed in the Nymphalidae, largely because two of the species look something like *Argynnis*. It seems unquestionably to be a true Danaid, fairly close in many respects to *Lycorea*. It may possibly serve as a clue to the phylogeny of the family, as its distribution seems to be of a relict sort. Gundlach (1881, p. 28) quotes Poey to the effect that "the head of the larva is black and thick, the body white and smooth, with two transverse lines (black?) on the first segment. The chrysalid resembles that of *Danaïs*." The genitalia are typically Danaid, with well developed hair tufts; the base of the anal vein of the forewing is forked.

The confusion in the application of the names *numidia* and *pantherata* is unfortunate. Hübner included the two species under *Anelia numidia*, one as male, the other as female; following the principle of page precedence, I have applied the name to the first figured, the male.

#### *Key to species*

1. F.w. dark brown above, with a row of white spots extending from the costal margin to the outer angle. . . . . 51. *A. cubana*  
F.w. light brown, with numerous darker spots. . . . . 2
2. H.w. above with three rows of dark spots, besides those on the margin of the wing. . . . . 49. *A. numidia*  
Only two rows of spots on h.w. above. . . . . 50. *A. pantherata*

#### 49. *ANELIA NUMIDIA NUMIDIA*

##### Fig. 9, venation

*Anelia numidia* Hübner, Ex. Schm., 2, pl. 22, f. 1, 2 (182-).

*Danaïs numidia*: Poey, 1847, p. 176.

*Clothilda pantherata*: Herrich-Schäffer, 1864b, p. 161; Gundlach, 1881, p. 28; Seitz, V, p. 402 (1913).

*Clothilda numida*: Salvin, 1869, p. 393; Hall, 1925, p. 186.

*Clothilda numidia*: Hall, 1930, p. 13.

This butterfly looks strikingly like a North American *Argynnis*, although not at all related to that group. Above, the wings are light brown, with narrow dark borders which include light spots between

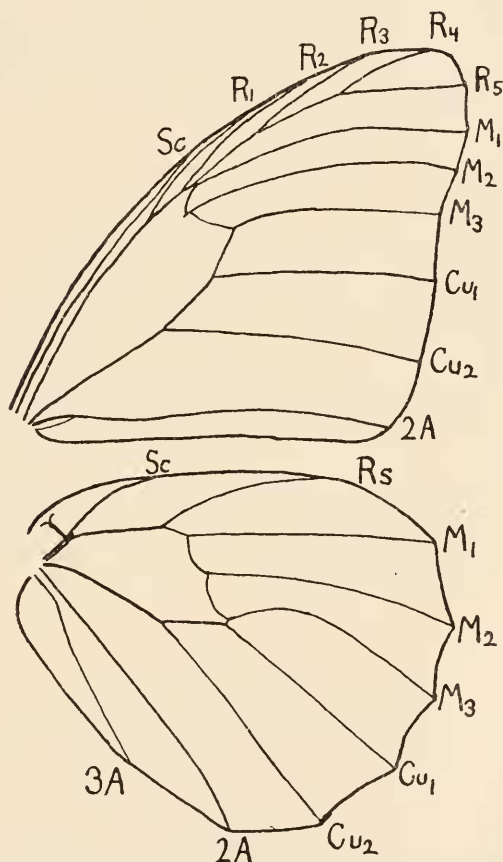


Fig. 9. *Anelia numidia*, venation.

the veins. Both wings are crossed by three rows of dark spots. This pattern is repeated on the under side of the forewing, but the hindwing is quite different, mottled with light and dark brown, with numerous irregular fine white lines. The females are somewhat lighter in color than the males. Length of f.w., 38-45 mm.

*Met.* Gundlach (quoting Poey) states that the larva lives on the shrub called "Espuela de Caballero" (*Jacquinia*, family Theophrastaceae).

*Dist.* This species is found only in Cuba and Hispaniola. Gundlach found it in the vicinity of Matanzas; we observed it quite commonly in the Trinidad Mountains at altitudes above 2,000 ft. There are 22 specimens in the M.C.Z. from Oriente (Torquino, 100 and 3,000 ft., Querci) and Sta. Clara (Buenos Aires, 3,000 ft., San Blas, 600 and 2,000 ft.).

#### 50. ANELIA PANTHERATA CLARESCENS

*Anelia numidia* Hübner, Ex. Schm., II, pl. 23, f. 3, 4, (182-).

*Clothilda numida*: Gundlach, 1881, pl. 27; Seitz, V, p. 402, pl. 83d, e, (1913).

*Clothilda pantherata clarescens* Hall, 1925, p. 186; *id.*, 1930, p. 13.

This species is similar to the preceding, from which it may be distinguished by the character pointed out in the key, and by the under side of the hindwing, which is rather differently marked. Length of f.w., 46-50 mm.

*Dist.* This form is known only from Cuba, *pantherata* only from Hispaniola. Gundlach considered this to be commoner than the preceding species, but there are only three specimens in the M.C.Z., all from Oriente ("Cuba, Wright").

#### 51. ANELIA CUBANA

*Clothilda jaegeri*: Herrich-Schäffer, 1862, p. 119; *id.*, 1864b, p. 161.

*Clothilda cubana* Salvin, 1869, p. 396; Gundlach, 1881, p. 28; Seitz, V, p. 402, pl. 83d, e, (1913).

The wings above are very dark brown, the forewing crossed by a band of white spots, the hindwing by an almost straight whitish post-discal band. On the under side there are some red markings on the discal area of the forewing, and irregular blue lines in the base of the cell, in addition to the white spots. The hindwing is fuscous, with a diffuse light shading on the postdiscal area. Length of f.w., 47-57 mm.

*Dist.* This species is known only from Cuba; it may be a choromorph of the Hispaniolan *jaegeri* which I have not seen. The U.S.N.M. has a beautiful series of 8 specimens from Oriente (Tanamo), col-

lected by Schaus and Barnes; Dr. Schaus kindly presented one of these to the M.C.Z.

### Genus XV. HYMENITIS Hübner

Genotype, *Papilio diaphanus* Drury.

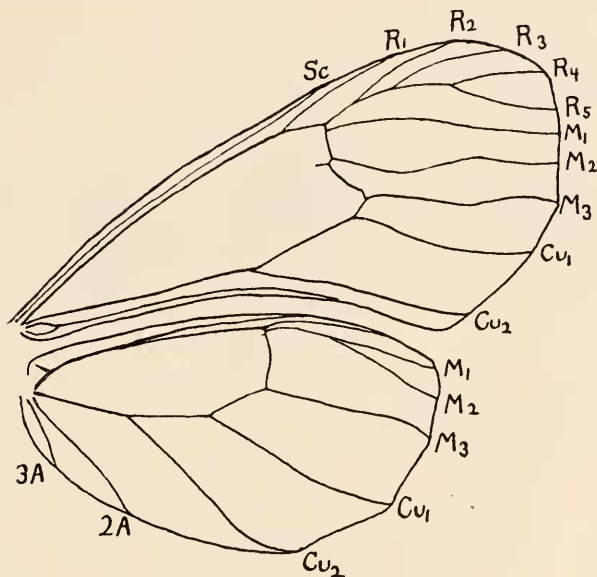


Fig. 10. *Hymenitis cubana*, venation.

### 52. HYMENITIS CUBANA

Fig. 10, venation

*Hymenitis cubana* Herrich-Schäffer, 1862, p. 118; *id.*, 1864b, p. 161; Gundlach, 1881, p. 19; Haensch in Seitz, V, p. 164 (1910).

This insect is at once recognizable as the only Cuban butterfly with transparent wings. The apex of the forewing is dark grey, with a white subapical band, and both wings have a narrow grey margin, brown on the underside; otherwise the wings are quite transparent. Length of f.w., 26–29 mm.



*Met.* Gundlach states that the larva lives on "Galan" (*Cestrum*), but he does not describe it.

*Dist.* This species is limited to Cuba where, according to Gundlach, it inhabits the mountains of both ends of the island, but not the central Trinidad range. In the M.C.Z. there are 11 specimens from Oriente ("Cuba, Wright," and Sierra Maestra, 1000 ft., July and Feb., Querci).

#### Family IV. SATYRIDAE

This large family is represented in the Greater Antilles by only one genus, with one species in Cuba, another in Jamaica, several in Hispaniola, and one in Puerto Rico.

#### Genus XVI. CALISTO Hübner

Genotype, *Calisto herophile* Hübner.

#### 53. CALISTO HEROPHILE

##### Fig. 11, venation

*Calisto herophile* Hübner, Ex. Schm., Zutr., 2nd Hndrd., p. 16, f. 269, 270 (1823); Herrich-Schäffer, 1864b, p. 161; Lathy, 1899, p. 226, pl. 4, f. 8, 9; Gundlach, 1881, p. 26; Holland, 1916, p. 494; Weymer in Seitz, V, p. 240, pl. 51f (1911); Gaede, 1931, p. 479.

*Satyrus herophile*: Poey, 1847, p. 179.

The upper side is dark grey, darker at the base of the wings; in the male the scales at the base of the forewing are modified to form a broad "stigma," as indicated in the figure. The ground color of the under side is lighter grey, marked with various dark lines and spots. On the forewing there is a subapical ocellus, and a small ochraceous patch near the base of the costa; the hindwing has an eyespot near

the anal angle, and a postdiscal row of tiny white spots, which are occasionally surrounded by a bluish area. Length of f.w., 15-19 mm.

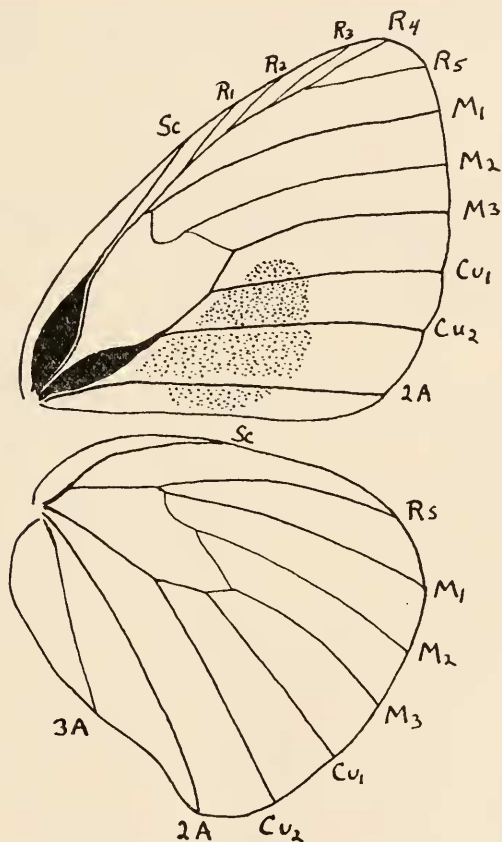


Fig. 11. *Calisto herophile*, venation.

*Dist.* This species is limited to Cuba, the Isle of Pines and the Bahamas, where it is everywhere common. In the M.C.Z. there are 88 specimens from Oriente, Sta. Clara (Soledad) and Habana.

## Family V. NYMPHALIDAE

This family includes most of the common, brightly marked roadside butterflies. The group has never been thoroughly monographed, and as a result, its classification is in a very confused state.

*Key to genera*

1. H.w. with cell closed by a normally developed vein, clearly discernable on the upper side without denuding the wings.<sup>1</sup> . . . . .2  
     Cell of h.w. open, or closed by a vestigial vein. . . . .3
2. Antennae about half as long as f.w. or longer, club elongate, gradually thickened; Cuban species black with yellow bars.  
     XVII. *Heliconius*  
     Antennae less than half as long as f.w., club shorter, distinct;  
     Cuban species brown, with black bars and some light spots at apex of f.w. . . . .XVIII. *Eucides*
3. Cubital vein of f.w. inflated from the base nearly to the first branch (as in the Satyrids). . . . .4  
     Cu normal . . . . .5
4. Cell of f.w. open; brown butterflies, with blue eyespots on h.w. beneath. . . . .XXXIV. *Lucinia*  
     Cell of f.w. closed; dark grey butterflies, usually with some white spots on the apex of f.w. . . . .XXXV. *Eunica*
5. Discal cell of f.w. closed by a distinct vein, or by a rudimentary vein that can usually be seen from the under side.<sup>2</sup> . . . . .6  
     This cell open . . . . .20
6.  $M_2$  of f.w. arising about halfway between  $M_1$  and  $M_3$ ; brown butterflies with dark markings . . . . .7  
     The distance between the bases of  $M_1$  and  $M_2$  is  $\frac{1}{3}$  or less of that between  $M_1$  and  $M_3$ ; variously colored butterflies . . . . .9

<sup>1</sup>Cuban genera with the cell of the hindwing closed by a vestigial vein, liable to cause confusion, are: *Vanessa*, *Hypolimnas*, *Colobura* and *Anaea*. All of these have normally shaped wings, while the genera in couplet 2 have narrow, elongate forewings.

<sup>2</sup>The following genera with the cell partially closed (go to couplet 6) may cause confusion: *Phyciodes*, small checkered brown butterflies; *Dynamine*, small species with two ocelli on the under side of the hindwing; *Prepona*, large black butterflies with a prominent blue median band on both wings.

*Precis*, a genus of grey butterflies with two large ocelli on the hindwing above, has the cell open, although the scaling sometimes gives the appearance of a vein; they go to couplet 20.

7. Precostal vein of h.w. bent away from the base of the wing; wings normal in shape, not marked with silver beneath.

XXI. *Euptoicta*

PC vein bent toward the base of the wing; f.w. elongate, or the under side marked with silver. . . . . 8

8. No silver spots on under side; paronychia and pulvillus present on claws of hind tarsi. . . . . XIX. *Colaenis*

H.w. and apex of f.w. beneath strikingly marked with silver spots; paronychia and pulvillus absent. . . . . XX. *Dione*

9. Antennae with a distinct club, usually colored or marked differently from the shaft; either compressed or spindle shaped. . . 10

Antennae thickening gradually toward the tip. . . . . 15

10.  $R_1$  of f.w. branches off the radial stem before the end of the cell, the radius not branching again until considerably beyond the cell. . . . . 11

$R_1$  and  $R_2$  branch off before the end of the cell. . . . . 12

11. 3rd joint of palpus long and thin; outer margin of f.w. excavated in the region of  $Cu_1$ , or evenly rounded, but not noticeably produced apically; quite small brown butterflies with checkered markings. (Fig. 12, venation.) . . . . . XXII. *Phyciodes*

3rd joint of palpus thicker; apex of f.w. distinctly produced; larger butterflies, the only Cuban species with a submarginal row of white spots in the heavy black border of f.w. above.

XXIII. *Chlosyne*

12. H.w. with short, slender tails at  $M_3$  and  $Cu_2$ ; the Cuban species brown with some silvery markings on the under side.

XXV. *Hypanartia*

H.w. not tailed or lobed; not marked as above. . . . . 13

13. Cell of h.w. open; small species, f.w. less than 22 mm. long; h.w. marked with white on under side, with two dark eyespots.

XXXVI. *Dynamine*

Cell of h.w. closed by a vestigial vein; large species, f.w. more than 24 mm. long, variously colored. . . . . 14

14. Eyes naked; male black, with four large oval white spots on wings above; female uniform brown except for thin marginal markings and the black apex of f.w., which is marked with white.

XXX. *Hypolimnas*

Eyes hairy; one species black, with a red bar on f.w.; the others brown marked with black, and with eyespots on h.w. beneath.

XXIV. *Vanessa*

15. The first branches of radius of f.w. fuse with Sc, or seem to cross it; h.w. with a short but distinct tail at  $M_3$  (Fig. 13, venation).  
 XLII. *Anaea*  
 Sc of f.w. free; no tail at  $M_3$  of h.w., or at most (*Coca*) a slight lobe.....16
16. Eyes hairy; wing pattern including a pearly white band on the upper side of both wings.....XXXVII. *Adelpha*  
 Eyes naked; no white band on wings above.....17
17. H.w. distinctly lobed at the anal angle, including veins  $Cu_2$  and 2A in the lobe; f.w. above marked with red or yellow.....18  
 H.w. rounded at anal angle; f.w. above marked with blue, or brown with white spots.....19
18. Antennae more than half as long as costa of f.w.; wings grey above with a broad yellow bar across f.w.....XXXIII. *Colobura*  
 Antennae shorter; wings black and red.....XLI. *Siderone*
19. Palpi long, projecting forward; h.w. dentate at  $M_3$ ; upper side of wings brown, apex of f.w. black with some white spots.  
 XXXII. *Coca*  
 Palpi erect, appressed to the front of the head; h.w. not toothed at  $M_3$ ; wings black above, with prominent central blue bands.  
 XL. *Prepona*
20.  $R_1$  and  $R_2$  of f.w. fuse with Sc and seem to cross it, much as in *Anaea* (Fig. 13); two very common species, one white above marked with wavy dark lines; the other dark brown, with a white patch in the center of each wing.....XXVII. *Anartia*  
 $R_1$  and  $R_2$  free from Sc; not marked as above.....21
21. H.w. with a long slender tail at  $M_3$ , in addition to a prominent lobe at the anal angle.....XXIX. *Athena*  
 H.w. at most lobed or toothed at  $M_3$ .....22
22. H.w. toothed at  $M_3$ ; a large butterfly with large translucent light green spots on wings.....XXVIII. *Metamorpha*  
 H.w. not toothed at  $M_3$ ; no translucent green spots.....23
23.  $R_2$  of f.w. arising beyond end of cell; brown butterflies, with a row of small eyespots between the veins on the under side of h.w.  
 XXXIX. *Asterocampa*  
 $R_2$  and  $R_1$  of f.w. both arising before end of cell; no eyespots on h.w. below, or only two or three.....24
24. Two prominent eyespots on h.w. above;  $M_2$  of f.w. connected with  $M_1$  by a curved discocellular vein that is about  $\frac{1}{3}$  as long as the distance between  $M_1$  and  $M_3$ .....XXVI. *Precis*

- No eyespots on wings above; discocellular between  $M_2$  and  $M_1$  short, occupying much less than  $\frac{1}{3}$  of the distance between  $M_1$  and  $M_3$ . . . . . 25
25. A large and powerful butterfly, above entirely brown and black, except for a white spot at the apex of f.w.;  $R_3$  parallels  $R_{4-5}$  of f.w. for some distance before diverging to the costa.

XXXI. *Historis*

Medium-sized butterflies, dark grey, with a white median line on h.w., which in the male is included in a purple reflecting area;  $R_3$  diverges steadily from its point of origin near the cell toward the costa. . . . . XXXVIII. *Doxocopa*

Genus XVII. *HELICONIUS* Kluk

Genotype, *Papilio charithonia* Linnaeus.

*Heliconius* Latreille, genotype *Papilio antiochus* Linnaeus.

*Migonitis* Hübner (*nec* Rafinesque), genotype *Papilio erato* Linn.

*Apostrophia* Hübner, genotype *Papilio charithonia* Linn.

Here, as in *Danaus*, I have followed Hemming (1933, p. 223); if the Kluk reference is unavailable, the genus can be dated from Latreille, with a change in genotype but no change in significance.

54. *HELICONIUS CHARITHONIA CHARITHONIA*

*Papilio charithonia*, Linnaeus, 1767, p. 757.

*Heliconia charitonia*: Poey, 1847, p. 176; Herrich-Schäffer, 1864b, p. 161.

*Heliconius charithonia*: Gundlach, 1881, p. 20; Holland, 1916, p. 488; Holland, 1931, p. 75, pl. 8, f. 5.

*Heliconius charithonia charithonia*: Stichel & Riffarth, 1905, p. 214; Seitz, V, p. 394, pl. 79a (1913); Neustetter, 1929, p. 67.

This is a striking butterfly, at once distinguishable from anything else occurring north of Panama by the long, narrow black wings, crossed by bright yellow bars: three on the forewing and a median one on the hindwing, where there is also a complete row of small yellow submarginal spots.

The species has a remarkably constant pattern throughout its wide range; West Indian specimens perhaps tend to vary more than continental ones, but the insular races are not very well marked. The most striking aberration that I have seen is one of our Cuban speci-

mens, in which the wings are dark brown, with the usual yellow markings replaced by light brown, with many white scales. Other specimens from Cuba and Hispaniola show varying amounts of brown scaling in the yellow. An additional yellow spot on  $Cu_1$  of the forewing is present on five specimens from Cuba, one from St. Thomas, and one from Jamaica; it is also sometimes found on Florida specimens. The width of the yellow bands varies greatly; they are sometimes especially narrow in Hispaniolan specimens, and invariably especially wide in the Jamaican form. There is an astonishing variation in size in our Cuban series, the costal length ranging from 32 to 46 mm. in captured specimens.

*Met.* The larva, which has often been described, lives on *Passiflora*.

*Dist.* The typical subspecies extends from the southern United States to Venezuela and Colombia; a distinct choromorph is found in Ecuador and Peru, and another in Jamaica. There are 55 Cuban specimens in the M.C.Z. from Oriente, Sta. Clara (Soledad) and Habana.

### Genus XVIII. EUEIDES Hübner

Genotype, *Nerëis dianasa* Hübner.

#### 55. EUEIDES CLEOBAEA CLEOBAEA

*Eueides cleobaea* Geyer in Hübner, *Zutr.*, 4th Hndrd., p. 7, f. 601, 602 (1832); Herrich-Schäffer, 1864b, p. 161; Gundlach, 1881, p. 22; *id.*, 1891, p. 445; Seitz, V, p. 398 (1913).

*Heliconia isabella*: Poey, 1847, p. 177.

*Eueides cleobaea cleobaea*: Stichel & Riffarth, 1905, p. 242; Neustetter, 1929, p. 115.

The forewing is brown, the apex black, with two rows of light brown spots; the middle of the cell is also black, as is the area between veins  $Cu_2$  and 2A. The hindwing is black and brown, with a submarginal row of tiny white spots. The under side is similar to the upper. Length of f.w., 36–38 mm.

*Met.* The larva lives on *Passiflora*, according to Gundlach (1891); the earlier record from *Asclepias* was in error.

*Dist.* This species is widespread in Middle America. The Cuban form, which has two color varieties, with the spots on the forewing either light brown or yellow, differs but slightly from the Central American choromorph. The subspecies found on Hispaniola is more distinct.



There are six specimens in the M.C.Z. from Oriente; according to Gundlach, the species is found in all parts of Cuba, but very locally.

### Genus XIX. COLAENIS Hübner

Genotype, *Papilio julia* Fabricius.

#### 56. COLAENIS JULIA NUDEOLA

*Argynnis delila*: Poey, 1847, p. 124.

*Colaenis delila*: Herrich-Schäffer, 1864b, p. 162; Gundlach, 1881, p. 55.

*Colaenis julia cillene*: Stichel, 1907, p. 12, pl. 2, f. 1; Holland, 1916, p. 489;

Seitz, V, p. 400, pl. 84b (1913); Riley, 1926, p. 240.

*C. julia cillene* form *nudeola* Stichel, 1907, p. 12.

The forewing above is light brown, devoid of markings in the male except for a triangular black spot at the end of the cell, and a small spot on the base of  $M_3$ , which may be absent. The veins are usually lightly outlined with black, and the outer margin is thinly bordered with black. The hindwing is brown except for a narrow border of black on the outer margin. The underside is lighter, slightly mottled. The female is darker than the male, with heavier borders on the wings, and with a black band crossing the forewing from the tip of the cell to the outer margin, between veins  $M_3$  and  $Cu_1$ ; it is occasionally interrupted near the margin. There is also a black shading between veins  $Cu_2$  and  $2A$ , sometimes forming a definite bar. Length of f.w., 37-39 mm.

I have not seen any immaculate Cuban specimens (typical form *nudeola*), but Stichel's name seems to be the only one available for the Cuban subspecies. The type of Cramer's *cillene* probably came from Surinam, as he states in the original description; it is exceedingly unlikely that he had Cuban material.

*Met.* The larva, which was described by Gundlach, lives on *Passiflora*.

*Dist.* This species is found almost everywhere in tropical America, and it is made up of a rather large number of well defined choromorphs. *Nudeola* is limited to Cuba, the Bahamas and southern Florida; distinct forms inhabit Hispaniola, Jamaica and many of the Lesser Antilles. In the M.C.Z. there are 48 specimens from Oriente, Sta. Clara (Soledad) and Habana. The U.S.N.M. specimens are from Oriente, Pinar del Rio and the Isle of Pines.

## Genus XX. DIONE Hübner

Genotype, *Papilio juno* Cramer.

## 57. DIONE VANILLAE INSULARIS

*Argynnis passiflorae*: Poey, 1847, p. 124.

*Agraulis vanillae*: Herrich-Schäffer, 1864b, p. 163.

*Dione vanillae*: Gundlach, 1881, p. 57; Seitz, V, p. 401, pl. 84f (1913); Holland, 1931, p. 79, pl. 8, f. 7.

*Agraulis insularis* Maynard, 1889, p. 89, pl. 8, f. 1a, 1b.

*Dione vanillae insularis*: Stichel, 1907, p. 19; Holland 1916, p. 490; Riley, 1926, p. 243.

The large silver spots on the under side of this butterfly at once separate it from all of the other Cuban species. The upper side is brown, with various black markings, especially on the veins of the forewing and along the outer margin of the hindwing. Length of f.w., 27-34 mm.

*Mct.* The larva, which feeds on *Passiflora*, has often been described.

*Dist.* The choromorphs of *D. vanillae* are for the most part not clearly defined. Cuban specimens are very like those from the Bahamas (type locality of *insularis*) and from the other islands of the Greater Antilles; the same form is common in southern Florida, and it probably merges imperceptibly with the Central American *incarnata* in the southern United States. The differences between *insularis* and the typical *vanillae* of northern South America are slight and not constant. The butterfly is found almost everywhere in the American tropics, even on isolated islets; it must be a great wanderer, and it is not surprising that well marked choromorphs are not found in the West Indies.

There are 48 specimens in the M.C.Z. from Oriente, Sta. Clara (Soledad) and Habana. The U.S.N.M. specimens are from Oriente, Pinar del Rio and the Isle of Pines.

## Genus XXI. EUPTOIETA Hübner

Genotype, *Papilio claudia* Cramer.

## 58. EUPTOIETA HEGESIA

*Papilio hegesia* Cramer, Pap. Ex., III, p. 30, pl. 209, f. E. F, (1779).

*Argynnis hegesia*: Poey, 1847, p. 124.

*Euptoieta columbina*: Herrich-Schäffer, 1864b, p. 162.

*Euptoieta hegesia*: Gundlach, 1881, p. 44; *id.*, 1891, p. 447; Seitz, V, p. 404, pl. 85a (1913); Holland, 1916, p. 491; *id.*, 1931, p. 81, pl. 8, f. 8.

The upper side of this species is brown, marked with numerous black lines and spots on the forewing; the hindwing is immaculate except for a double black line on the margin, and a submarginal row of small round black spots. The under side of the hindwing is somewhat variable; it is usually mottled with brown and grey, with a fine network of dark lines. Length of f.w., 21–30 mm.

*Met.* Gundlach found the larva on “Mari-Lope” (*Turnera*).

*Dist.* This species is widely distributed in the American tropics; the type locality is Jamaica, and the West Indian population seems homogeneous, although possibly distinct from that found on the continent. In the M.C.Z. there are 54 specimens from Oriente, Sta. Clara and Habana. We did not find it in the immediate vicinity of Soledad, although it was rather common in the mountains.

## Genus XXII. PHYCIODES Hübner

Genotype, *Papilio tharos* Drury.

This genus has recently been monographed by Hall (1928–30).

*Key to species*

1. Under side of f.w. with a square dark brown spot between veins  $M_3$ – $Cu_2$ , which sends two teeth down into the  $2A$ – $Cu_2$  area.

61. *P. frisia*

Under side of f.w. without such a spot. . . . . 2

2.  $M_3$ – $Cu_2$  area on under side of f.w. dark brown basally, then cream, then orange, and finally, on the outer margin, dark brown, with a cream colored spot between  $M_3$ – $Cu_1$ . . . . . 59. *P. phaon*

This area reddish brown, with a coarse black network.

60. *P. pelops*

## 59. PHYCIODES PHAON PHAON

*Melitaea phaon* Edwards, 1864, p. 505.

*Phyciodes phaon*: Röber in Seitz, V, p. 436 (1913), pl. 89c; Holland, 1931, p. 137, pl. 17, f. 22, 23.

*Phyciodes phaon phaon*: Hall, 1928, p. 40.

This little butterfly seems not to have been reported from Cuba previously. It may be distinguished from the common *P. frisia* by its more variegated pattern, which includes on the forewing above a light band that runs from near the middle of the costa to the inner margin: this band is always interrupted in the middle in *P. frisia*. The under surface is quite differently marked in the two species.

*Dist.* This species occurs over the southern United States and northern Central America; Hall has described a subspecies from Guatemala. There is one specimen in the M.C.Z. from Cojimar, near Habana, Nov. 23, 1930, collected by S. C. Bruner; the U.S.N.M. has four specimens from Habana.

## 60. PHYCIODES PELOPS AEGON

*Papilio aegon* Fabricius, 1781, p. 130.

*Melitaea anocaona* Herrich-Schäffer, 1864b, p. 162.

*Phyciodes pelops*: Gundlach, 1881, p. 53; Röber in Seitz, V, p. 437, pl. 89f (1913).

*Phyciodes pelops aegon*: Hall, 1929, p. 61.

This is one of the smallest species of the genus. Above the wings are entirely covered with a checkered pattern of reddish-brown and black. The forewing on the under side is reddish-brown with some black lines and spots; the hindwing has a complicated pattern, usually much brighter and clearer in the female than in the male. The males have a curious tuft of hair on the inner margin of the hindwing above, which folds into a pocket along this margin. Length of f.w., 8-11 mm.

*Dist.* Hall gives Jamaica and Cuba as the habitat of this form, Hispaniola, Puerto Rico and St. Kitts as the habitat of *P. pelops pelops*. This is, then, the only butterfly known with one subspecies common to Jamaica and Cuba, and another subspecies in Hispaniola; I have seen no Jamaican specimens, so I cannot check this arrangement. There are 91 specimens in the M.C.Z. from Oriente, Sta. Clara (only near the coast) and Habana.

## 61. PHYCIODES FRISIA FRISIA

Fig. 12, venation

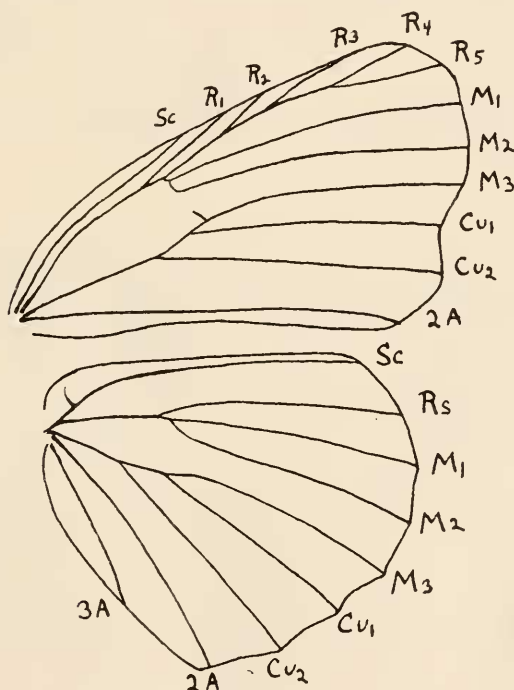
*Melitaea frisia* Poey, 1832, no. 2, 3 figs.; *id.*, 1847, p. 125.

*Eresia frisia*: Herrich-Schäffer, 1864b, p. 162; Holland, 1916, p. 491.

*Phyciodes frisia*: Gundlach, 1881, p. 53; Röber in Seitz, V, p. 437, pl. 89e (1913).

*Phyciodes frisia frisia*: Hall, 1929, p. 83.

*Anthanassa frisia*: Holland, 1931, p. 140, pl. 17, f. 42.

Fig. 12. *Phyciodes frisia frisia*, venation.

The outer half of the forewing above is mostly black, with some light brown spots; the hindwing is brown, with lighter and darker bands and spots. The ground color beneath is lighter, with a somewhat more complicated pattern. The sexes are similar. Length of f.w., 12-20 mm.

*Dist.* This subspecies is found in Florida and the Greater Antilles; other choromorphs occur in Central America and northern South America. In the M.C.Z. there are 37 specimens from Oriente, Sta. Clara (Soledad) and Habana; the U.S.N.M. specimens are from Oriente and the Isle of Pines.

### Genus XXIII. CHLOSYNE Butler

Genotype, *Papilio janaïs* Drury.

#### 62. CHLOSYNE PEREZE PEREZE

*Synchlœ perezi* Herrich-Schäffer, 1862, p. 119; *id.*, 1864, p. 162.

*Chlosyne perezi*: Gundlach, 1881, p. 54; Röber in Seitz, V, p. 452, pl. 91h (1914).

*Chlosyne perezi perezi*: Forbes, 1928, p. 98.

The ground color is very dark brown, with three broken reddish-brown bands across the basal half of both wings, sometimes merging on the hindwing, and a submarginal row of white spots on the forewing. The forewing is similar on the under side; the hindwing has some yellow and white spots toward the base, a postdiscal row of reddish-brown spots, and a submarginal row of white V-shaped spots. Length of f.w., 24-30 mm.

*Dist.* This choromorph is limited to Cuba, where Gundlach found it in the vicinity of Baracoa. I have not seen the related forms *pantoni* (Jamaica) and *tukita* (Puerto Rico, ?Hispaniola), so that I cannot judge whether they should be considered as species or not; I have followed Forbes in making them subspecies. The only specimens of *perezi* in the M.C.Z. are a pair from the original lot, received through Scudder. The U.S.N.M. has a nice series from Santiago de Cuba.

### Genus XXIV. VANESSA Fabricius

Genotype, *Papilio atalanta* Linnaeus.

*Pyrameis* Hübner, genotype *Papilio atalanta* Linn.

This is an instance where departure from the International Rules seems necessary. The genotype of *Cynthia* Fabricius is *Papilio cardui* Linn.; *Cynthia* has page precedence over *Vanessa* and therefore should be the generic name for the *atalanta-cardui* group of butterflies. Un-

fortunately *Cynthia* has been used almost universally since 1849 for an Indo-Australian group of butterflies with *Papilio arsinoe* Cramer as genotype. A change of names, then, cannot be made without taking both groups into consideration. In any event, there would probably be less confusion if *Vanessa*, type *atalanta*, and *Cynthia*, type *arsinoe*, were treated as *nomina conservanda*.

### Key to Species

1. F.w. above black, crossed by an orange band that extends from the costa to the outer angle . . . . . 63. *I. atalanta*  
F.w. above brown, with no such band . . . . . 2
2. H.w. below with two large eyespots . . . . . 64. *I. virginicnsis*  
H.w. below with a submarginal row of at least four eyespots  
65. *I. cardui*

## 63. VANESSA ATALANTA

*Papilio atalanta* Linnaeus, 1758, p. 478.

*Vanessa atalanta*: Poey, 1847, p. 122; Holland, 1931, p. 153, pl. 43, f. 4.

*Pyrameis atalanta*: Herrich-Schäffer, 1864b, p. 162; Gundlach, 1881, p. 39; Seitz, V, p. 458, pl. 94a (1914).

The upper surface is black, the forewing with a transverse orange bar and some white subapical spots; the hindwing with a broad orange band on the outer margin. The pattern of the under side is more variegated and complex. Length of f.w., 30–35 mm.

*Met.* The food plants of this species in the United States are *Humulus*, *Boehmeria*, *Urtica* and *Parietaria*.

*Dist.* This is a common species in North America, Europe and temperate Asia. In Cuba, Gundlach found it near Güines and San Jose de las Lajas (Habana) and near Cienfuegos (Sta. Clara); I caught a single male at San Blas, in the Trinidad Mountains (600 ft.), Sta. Clara. There are two specimens in the M.C.Z. from Hispaniola, but it has not yet been found on the other islands.

## 64. VANESSA VIRGINIENSIS VIRGINIENSIS

*Papilio cardui virginiensis* Drury, 1770, [p. 10], index, pl. 5, f. 1 [1773].

*Pyrameis huntera*: Herrich-Schäffer, 1864b, p. 162; Gundlach, 1881, p. 41.

*Pyrameis virginiensis*: Seitz, V, p. 459, pl. 94b (1914).

*Vanessa virginiensis*: Holland, 1931, p. 154, pl. 1, f. 2; pl. 33, f. 6.



This and the following species are very similar on the upper side, but they may be at once distinguished by the eyespots of the under side, as pointed out in the key. The upper side is brown, with various angular dark spots, and some apical white spots on the forewing; the hindwing is similar, with the ocelli of the under side represented by a row of black submarginal spots. Length of f.w., 25-30 mm.

*Met.* The food plants listed in the literature on this species include *Gnaphalium*, *Arctium*, *Helianthus* and *Antennaria*.

*Dist.* This is a common North American butterfly, which Gundlach found in Cuba only on the mountain called "Gran Piedra" to the east of Santiago de Cuba (Oriente); I have seen no Cuban specimens. It is also reported from the other West Indian islands, and several choromorphs have been described from South America.

#### 65. VANESSA CARDUI

*Papilio cardui* Linnaeus, 1758, p. 475.

*Vanessa cardui*: Poey, 1847, p. 122; Holland, 1931, p. 154, pl. 1, f.1.

*Pyrameis cardui*: Herrich-Schäffer, 1864b, p. 162; Gundlach, 1881, p. 40; Seitz, V, p. 458 (1914).

The salient characters of this species have already been pointed out. The general pattern of the under side of the hindwing is quite different from that of *virginiensis*. Length of f. w., about 30 mm.

*Met.* The food plants include *Carduus*, *Althaea*, *Cnicus*, *Silybum*, *Onopordon*, *Arctium*, etc.

*Dist.* This cosmopolitan species occurs sparingly in Cuba in October, according to Gundlach; he does not mention any specific localities. I have seen no Cuban specimens.

#### Genus XXV. HYPANARTIA Hübner

Genotype, *Papilio paullus* Fabricius.

#### 66. HYPANARTIA PAULLUS

*Papilio paullus* Fabricius, 1793, p. 63.

*Hypanartia tecmesia* Hübner, Ex. Schm., II, pl. 27, 4 figs. (182-).

*Vanessa lethe*: Poey, 1847, p. 123.

*Eurema tecmesia*: Herrich-Schäffer, 1864b, p. 161.

*Hypanartia paullus*: Gundlach, 1881, p. 38; Seitz, V, p. 460, pl. 94c (1914).

The ground color above is brown, with some dark brown bands on the apical half of the forewing of the male, and a double dark marginal band in both sexes. The hindwing is brown, with dark submarginal lines, and a black anal spot with some central blue scaling; this wing is toothed at  $M_3$  and  $Cu_2$ . The wings are more variegated on the under side, with various wavy lines of brown and silvery white. The male is darker than the female. Length of f.w., 27-32 mm.

*Dist.* This species is found only in the West Indies, where it occurs on all of the large islands. There are 4 specimens in the M.C.Z. from Oriente (Torquino River, 100 and 3000 ft.). The U.S.N.M. specimens are also from Oriente (Tanamo).

### Genus XXVI. *PRECIS* Hübner

Genotype, *Papilio octavia* Cramer.

*Junonia* Hübner, genotype *Papilio lavinia* Cramer.

There are two species of *Precis* in Cuba, distinct both in general habitus, and in the structure of the male genitalia. The precise nomenclature of these two forms, however, must depend on their relationship with the numerous continental varieties, and cannot be decided here. The American species of the genus need revision, but the task must be done by someone with ample material, with access to the types, and with sufficient patience to untangle the complicated bibliography that has grown up around the various names.

#### *Key to species*

1. First ocellus ( $M_1-M_2$ ) on h.w. above several times as large as the other ocellus, the distal half black, the proximal half pale.

65. *P. coenia*

This ocellus but little larger than the posterior ocellus, symmetrical, black except for a few purplish scales. . . . . 68. *P. zonalis*

### 67. *PRECIS COENIA*

*Junonia coenia* Hübner, Ex. Schm., 2, pl. 32, 4 figs. (182-); Herrich-Schäffer, 1864b, p. 163; Holland, 1916, p. 492; *id.*, 1931, p. 156, pl. 20, f. 7.

*Vanessa coenia*: Poey, 1852, p. 198.

*Junonia genoveva*: Gundlach, 1881, p. 65.

*Precis lavinia coenia*: Seitz, V, p. 461, pl. 94e (1914).

*Junonia lavinia coenia*: Forbes, 1928b, p. 306.

The ground color of the upper side is brownish grey. On the forewing there is a small ocellus between  $M_1$  and  $M_2$ , and another, large and distinct, between  $Cu_1$  and  $Cu_2$ , the two ocelli separated by a prominent white subapical band. There are two orange bars across the cell. On the hindwing, the ocellus at the outer angle is large and distorted, as mentioned in the key. On the under side, the ground color is much lighter, with the markings of the upper side repeated, with the addition of various fine reddish lines on the hindwing. Length of f.w., 20–37 mm.

*Mct.* The food plants in the United States include *Gerardia*, *Linaria*, *Ludwigia* and *Plantago*.

*Dist.* This is a common butterfly in the southern United States. Cuban specimens are quite constant in pattern, while those from the United States are very variable. In the M.C.Z. there are 13 specimens from Oriente, Habana and Pinar del Rio; there are specimens in the U.S.N.M. from the Isle of Pines.

#### 68. PRECIS ZONALIS

*Vanessa genoveva*: Poey, 1847, p. 123; *id.*, 1852, p. 198.

*Junonia lavinia*: Herrich-Schäffer, 1864b, p. 163; Gundlach, 1881, p. 64.

*Junonia zonalis* Felder & Felder, Reise Nov., p. 399 (1867).

*Junonia coenia genoveva*: Holland, 1916, p. 492.

*Junonia lavinia zonalis*: Forbes, 1928b, p. 307.

*Junonia genoveva*: Holland, 1931, p. 156, pl. 20, f. 9.

The character pointed out in the key will serve to distinguish this species from the preceding, the only Cuban form with which it is apt to be confused. There are many other differences, especially in the pattern on the under side of the hindwing. Cuban specimens show little variation. The name *zonalis* (types from Colombia, Cuba, Puerto Rico) seems to be about the best available for this form; its exact status cannot be determined without revision of the genus. Length of f.w., 24–30 mm.

*Mct.* Gundlach found the larva on a plant of the family Scrophulariaceae.

*Dist.* In the M.C.Z. there are 48 specimens from Oriente, Sta. Clara (Soledad) and Habana; very similar specimens are found on the other West Indian islands.

#### Genus XXVII. ANARTIA Hübner

Genotype, *Papilio jatrophae* Linnaeus.

*Key to species*

1. Ground color of f.w. very dark brown, with a white discal band.

70. *A. lytrea*

Ground color of wings white, with numerous fine dark lines, the wing margins light brown or orange. . . . . 69. *A. jatrophae*

69. *ANARTIA JATROPHAE JAMAICENSIS*

*Vanessa jatrophae*: Poey, 1847, p. 122.

*Anartia jatrophae*: Herrich-Schäffer, 1864b, p. 163; Gundlach, 1881, p. 59; *id.*, 1891, p. 448; Holland, 1916, p. 492.

*Anartia jatrophae jamaicensis* Möschler, 1886, p. 27.

*Anartia jatrophae saturata*: Seitz, V, p. 462 (1914).

The ground color is white, shaded with light grey, which usually covers the outer half of both wings; the outer margins are usually bordered by two rows of orange spots; there is a round black spot between veins  $Cu_1$  and  $Cu_2$  on the forewing, and two similar spots between  $M_1$  and  $M_2$ , and  $Cu_1$  and  $Cu_2$  on the hindwing, as well as numerous dark lines. This pattern is repeated on the under side, but the fine lines are here often shaded with pink. Cuban specimens, although darker on the average than those from the continent, seem never to show the complete infuscation often seen in specimens from Hispaniola and Puerto Rico. Length of f.w., 25–30 mm.

*Met.* Gundlach (1891) bred this species from "Orozús" (*Lippia*).

*Dist.* The choromorph *jamaicensis* is found only in the Antilles and southern Florida; it is best characterized by the presence of two rows of fulvous spots on the outer margin of the forewing; in *jatrophae*, found almost everywhere on the tropical mainland, the inner row of spots is white. In the M.C.Z. there are 114 specimens from Oriente, Sta. Clara (Soledad) and Habana.

70. *ANARTIA LYTREA CHRYSOPELEA*

*Anartia chrysopelea* Hübner, Zutr., 3rd. Hndrd., p. 34, f. 547, 548 (1825).

*Vanessa chrysopelea*: Poey, 1847, p. 123.

*Anartia litraea*: Herrich-Schäffer, 1864b, p. 163.

*Anartia lytrea*: Gundlach, 1881, p. 60; Holland, 1916, p. 492; Seitz, V, p. 463, pl. 94e (1914).

The forewing is dark brown, with a white band extending from the costa to vein  $Cu_2$ , and with a round black spot ringed with orange be-

tween veins  $Cu_2$  and 2A. The hindwing is similar, with a large triangular white median spot, and a small black and orange anal spot. Both wings have a narrow orange submarginal line, and various fine dark lines on the basal area. The under side is similar to the upper. Length of f.w., 22-26 mm.

Gundlach's "*Anartia n. sp.*" (1881, p. 61) seems to be *A. lytrea lytrea* (*dominica* Skinner), known only from Hispaniola. If this also occurs in Cuba, it would seem that we are dealing with two species; the record must be confirmed, however, as Gundlach did not himself collect the specimen to which he refers.

*Dist.* This species is known from Cuba, the Isle of Pines, Swan Is., Hispaniola and Antigua; the choromorph on Hispaniola is *lytrea*, while that on Antigua has been described as *eurytis* by Fruhstorfer. There are 84 specimens in the M.C.Z. from Oriente, Sta. Clara (Soleidad) and Habana. The U.S.N.M. specimens are from Matanzas and Pinar del Rio.

## Genus XXVIII. METAMORPHA Hübner

Genotype, *Papilio sulphitia* Cramer.

*Victorina* Blanchard, genotype *Papilio stelenes* Linnaeus.

### 71. METAMORPHA STELENES INSULARIS

*Vanessa steneles*: Poey, 1847, p. 121.

*Victorina steneles*: Herrich-Schäffer, 1864b, p. 163; Gundlach, 1881, p. 66.

*Victorina steneles lavinia*: Seitz, V, p. 463 (*partim*) (1914).

*Victorina steneles insularis* Holland, 1916, p. 493.

This very common butterfly is distinguished from all of its Cuban fellows by the prominent bands and spots of translucent pale green; the upper side is black in ground color, the under side grey and brown. Holland's characterization of the Cuban race is not very good, but the form does seem distinct enough to warrant naming; specimens from Hispaniola and Jamaica have but one large green spot in the cell of the forewing, while those from Cuba have two. The species is very variable, especially in the markings of the under side. Length of f.w., 38-45 mm.

*Met.* Gundlach lists "*Mazorquilla*" (*Blechnum*) as the food plant, but he does not describe the larva. Wolcott (1923, p. 142) has given some notes on the life history in Puerto Rico, where he found the larva on *Blechnum Brownei*.

*Dist.* This species occurs almost everywhere in the American tropics; it is abundant in Cuba, especially along shaded trails. In the M.C.Z. there are 42 specimens from Oriente, Sta. Clara (Soledad), Habana, and the Isle of Pines; the U.S.N.M. specimens are from the Isle of Pines and Matanzas.

## Genus XXIX. ATHENA Hübner

Genotype, *Papilio petreus* Cramer.

*Marpesia* Hübner, genotype *Marpesia eleucea* Hübner.

*Tymetes* Boisduval, genotype *Tymetes merops* Boisduval.

*Megalura* Blanchard, genotype *Nymphalis coresia* Godart.

### Key to species

1. Wings brown, crossed by black lines.....73. *A. eleucea*  
     Wings dark grey, crossed by lighter lines.....72. *A. chiron*

## 72. ATHENA CHIRON

Fig. 2, outline of wing.

*Papilio chiron* Fabricius, 1775, p. 452.

*Nymphalis chiron*: Poey, 1847, p. 47.

*Tymetes marius*: Herrich-Schäffer, 1864b, p. 161.

*Marpesia chiron*: Gundlach, 1881, p. 35.

*Megalura chironides* Staudinger, 1886, p. 134.

*Megalura chiron*: Seitz, V, p. 468, pl. 96a (1921).

*Athena chiron*: Holland, 1931, p. 162, pl. 21, f. 4.

The wings above are usually quite dark, with four longitudinal light lines, the basal line not as clear as the others. The apex of the forewing has five or six small white spots, that may be partially or wholly obscured (*chironides* Stgr.). The under side is very variable, usually silvery white basally, grey or brown on the outer half. The tail at  $M_3$  is well developed. The females are sometimes lighter colored than the males. Length of f.w., 28-30 mm.

*Met.* Gundlach found the larva on "Mora del pais" (*Chlorophora tinctoria*), which he lists as *Maclura tinctoria*.

*Dist.* This species occurs almost everywhere in the American tropics, but attempts to name geographical races have not been very successful. In the M.C.Z. there are 28 specimens from Oriente, Sta. Clara (Soledad) and Habana.

## 73. ATHENA ELEUCHEA ELEUCHEA

*Marpesia eleucha* Hübner, Zutr., 1st Hndrd., p. 32, f. 197, 198, (1818); *id.*,

Ex. Schm., 2, pl. 50, 4 figs. (182-); Gundlach, 1881, p. 35.

*Nymphalis eleucha*: Poey, 1847, p. 47.

*Timetes eleucha*: Herrich-Schäffer, 1864b, p. 161; Holland, 1916, p. 493.

*Megalura eleucha*: Seitz, V, p. 470, pl. 96e (1921).

The ground color of the wings above is brown; there are four black lines across the cell of the forewing, and two more, which reach the inner margin, beyond the cell. There are similar lines on the hindwing, and some black spots with blue scaling in the anal region. The tail at  $M_3$  is well developed, as is the anal lobe. The pattern of the under side resembles that of a dried leaf; it is quite variable. Length of f.w., 29-35 mm.

*Met.* Gundlach found the larva on *Ficus*.

*Dist.* This choromorph is limited to Cuba and the Bahamas; specimens from Hispaniola and Jamaica (*pellenis* Godt.) are less heavily marked. In the M.C.Z. there are 19 specimens from Oriente, Sta. Clara (Soledad) and Habana; the U.S.N.M. specimens are from Oriente, Matanzas and the Isle of Pines.

## Genus XXX. HYPOLIMNAS Hübner

Genotype, *Papilio pandarus* Linnaeus.

## 74. HYPOLIMNAS MISIPPUS

*Papilio misippus* Linnaeus, 1764, p. 264.

*Diadema bolina*: Herrich-Schäffer, 1864b, p. 162.

*Hypolimnas misippus*: Gundlach, 1881, p. 42; Brooks, 1903, p. 292; Seitz, V, p. 470 (1921); Holland, 1931, p. 145, pl. 21, f. 9, 10.

The male is black, with two large white spots on the forewing, and one on the hindwing, surrounded by areas of purple reflection. The female has the *Danaus* pattern: brown, with the apex of the forewing dark, enclosing some white spots. Length of f.w., 33-40 mm.

*Dist.* This is a common butterfly in the tropics of the Old World; it has been taken several times, at widely scattered localities in the Antillean region. I have not seen any Cuban specimens, and I know of no authentic records except those given by Gundlach (Cárdenas and Bemba) and Brooks (Guantanamo).



## Genus XXXI. HISTORIS Hübner

Genotype, *Papilio odius* Fabricius.

*Aganisthos* Boisduval, genotype *Papilio odius* Fabricius.

## 75. HISTORIS ODIUS ODIUS

*Papilio odius* Fabricius, 1775, p. 457.

*Nymphalis orion*: Poey, 1847, p. 44.

*Aganisthos orion*: Herrich-Schäffer, 1864b, p. 163.

*Aganisthos odius*: Butler, 1869, p. 54; Gundlach, 1881, p. 68, 441; Holland, 1916, p. 493.

*Historis orion odius*: Seitz, V, p. 471 (1921).

*Aganisthos odius orion*: Kaye, 1926, p. 470.

The upper side is brown, heavily bordered with black, with a single white spot in the apex of the forewing; the under side is more variegated, marked with various lines and shadings. The large size and simple pattern of this butterfly make it unmistakable. Length of f.w., 52-65 mm.

The nomenclature of this species seems quite clear. *Odius* has page precedence over *orion* in the 1775 paper of Fabricius, and therefore becomes the specific name. *Odius*, with the margin of the hindwing white, described from the "Indies," is surely the Antillean form, rather than *orion*, from "Surinam."

*Met.* The larva has been described by Gundlach and Kaye; it feeds on "Yagruma hembra" (*Cecropia*).

*Dist.* We have specimens from Hispaniola, Cuba and Jamaica, all distinct from the continental *orion* in the wider brown of the forewing, often produced to form a point above  $M_2$ , as well as in various other details. There are 2 specimens in the M.C.Z. from Oriente and Camagüey; it was seen at Soledad, but not captured. The U.S.N.M. has specimens from Oriente and the Isle of Pines.

## Genus XXXII. COEA Hübner

Genotype, *Papilio acheronta* Fabricius

## 76. COEA ACHERONTA

*Papilio acheronta* Fabricius, 1775, p. 501.

*Nymphalis acheronta*: Poey, 1847, p. 45.

*Megistanis cadmus*: Herrich-Schäffer, 1864b, p. 161.

*Megistanis acheronta*: Gundlach, 1881, p. 36.

*Coea acheronta*: Seitz, V, p. 471, pl. 104d; Holland, 1931, p. 171, pl. 60, f. 2.

This species is similar to the preceding (*II. odius*), but smaller, and with six white spots in the apex of the forewing. The under side is quite variable in the intensity and distribution of the markings. There is a short and slender tooth at vein  $M_3$  of the hindwing. Length of f.w., 40–47 mm.

*Dist.* This is a common species almost everywhere in tropical America. The only evidence of geographical variation that I have seen is in our three Cuban specimens, which are slightly different from specimens from Hispaniola, Jamaica, or any that I have seen from the continent. These Cuban specimens are without precise locality, however, and it seems best not to name this possible choromorph until fresh material is available.

### Genus XXXIII. COLOBURA Billberg

Genotype, *Papilio dirce* Linnaeus.

*Gynaecia* Doubleday, genotype *Papilio dirce* Linnaeus.

#### 77. COLOBURA DIRCE

*Papilio dirce* Linnaeus, 1758, p. 477.

*Vanessa dirce*: Poey, 1847, p. 121.

*Gynaecia dirce*: Herrich-Schäffer, 1864b, p. 162; Gundlach, 1881, p. 48; *id.*, 1891, p. 448; Seitz, V, p. 472, pl. 79a (1921).

The upper surface is a quite uniform grey, except for the broad transverse yellow band of the forewing. The under side has a zebra-like pattern of black lines on a creamy ground. Length of f.w., 35 mm.

*Met.* Gundlach found the larva on *Cecropia* ("Yagruma hembra"); the statement in Seitz that it lives on *Cassia* must be a mistake, as Müller (1886, p. 27) found it also on *Cecropia* in Brazil.

*Dist.* This is a rather common and widespread tropical American butterfly. It is found on various West Indian islands, and Gundlach reports it as occurring over the whole island of Cuba. I have seen no Cuban specimens.

### Genus XXXIV. LUCINIA Hübner

Genotype, *Lucinia sida* Hübner.

## 78. LUCINIA SIDA

*Lucinia sida* Hübner, Ex. Schm., 2, pl. 35, 4 figs. (182-); Gundlach, 1881, p. 69; Seitz, V, p. 475, pl. 97b (1914).

*Nymphalis cadma*: Poey, 1847, p. 49.

*Lucinia cadma*: Herrich-Schäffer, 1864b, p. 163; Holland, 1916, p. 492.

*Lucinia sida cubana* Fruhstorfer, 1912, p. 14.

The upper side is brown, with some irregular black markings on the forewing; in fresh specimens, the discal area of the hindwing shows pink reflections. On the under side, the forewing is marked as above; the hindwing, however, is white, with various brown markings and two large, compound, metallic green eyespots. Length of f.w., 19-23 mm.

*Mct.* Gundlach found the larva on "Angarilla," or "Clavelito de sabana" (*Echites*).

*Dist.* This form is limited to Cuba; other forms, possibly distinct enough to be called species, occur in Jamaica and Hispaniola. Fruhstorfer's name *cubana* was based on the erroneous supposition that *sida* was described from Hispaniola. In the M.C.Z. there are 29 specimens from Oriente, Sta. Clara (Soledad) and Habana; the U.S.N.M. specimens are from Matanzas and Habana.

## Genus XXXV. EUNICA Hübner

Genotype, *Papilio monima* Cramer.

*Key to species*

1. Upper side of h.w. grey, with no purplish reflections, but with a submarginal dark wavy line, and a postdiscal row of small round dark spots between the veins . . . . . 82. *E. heraclitus*  
Upper side of h.w. immaculate, dark, or with distinct purple reflections on the disc . . . . . 2
2. F.w. distinctly excavated on the outer margin just below the apex; a white spot on the upper side of this wing between veins Cu<sub>2</sub> and 2A, in addition to the apical spots . . . . . 79. *E. tatila*  
Outer margin of f.w. even; no white spot between veins Cu<sub>2</sub> and 2A . . . . . 3
3. Small, f.w. less than 20 mm. long; white spots of upper side of f.w. reduced, only one or two distinct . . . . . 81. *E. fairchildi*  
Larger, f.w. more than 20 mm. long; five white spots indicated on the upper side of f.w., and at least three well developed.  
80. *E. habanae*

## 79. EUNICA TATILA TATILA

*Cybdelis tatila* Herrich-Schäffer, 1850-58, p. 54, series II, fig. 69-72.

*Eunica tatila*: Herrich-Schäffer, 1864b, p. 162; Gundlach, 1881, p. 50; Holland, 1931, p. 158, pl. 59, f. 29.

*Eunica tatila tatila*: Seitz, V, p. 484, pl. 100Aa (1915).

The forewing above is dark, with six distinct white spots in the apical half; the purplish or blue reflection usually extends well over the basal half of the wing. The under side of the forewing is dark grey, with the spots of the upper side repeated; the pattern of the hindwing is too variable to be described briefly—it is always composed of brown and grey shades, resembling the bark of the trees on which the butterfly habitually rests. Length of f.w., 25-30 mm.

*Dist.* The supposed differences between Central American, Floridan and Cuban specimens are difficult to find when a series is studied. Most authors have assumed that Cuba is the type locality of the name, but the original reference mentions only "Am. mer." Kaye (1926, p. 473) has described a subspecies from Jamaica, but the character that he mentions—blue instead of purple reflection—is by no means peculiar to Jamaica; I have not seen any Jamaican specimens, however. From the material studied, it would seem that one form, *tatila*, ranges over all of middle America, while one or two fairly distinct choromorphs are found in the Brazilian region. There are 14 specimens in the M.C.Z. from Oriente (Sierra Maestra); the U.S.N.M. specimens are also from Oriente (Tanamo).

## 80. EUNICA MONIMA HABANAE

*Faunia orphisa*: Poey, 1847, p. 178; *id.*, 1852, p. 199.

*Eunica monima*: Herrich-Schäffer, 1864b, p. 162; Gundlach, 1881, p. 51.

*Eunica monima habanae* Seitz, V, p. 485, pl. 100Ac (1915).

This species is similar to the preceding, but slightly smaller, and easily enough distinguished by the characters pointed out in the key. In some females the purple reflection is entirely lacking (the *E. monima* of Seitz), but there seems to be no correlation of this character with season. Length of f.w., 20-24 mm.

The Cuban form is very similar to that found on the continent, which I take to be the true *monima* of Cramer, subsequently named *modesta* by H. W. Bates (not the *modesta* of Seitz!). Cuban specimens are uniformly larger than continental specimens, and show a somewhat different range of variation.

*Met.* The larva of the Central American form was described by Dyar (1912, p. 54) under the name *Eunica modesta*; he lists *Zanthoxylum pentamon* as the food plant.

*Dist.* This form occurs in Cuba, Hispaniola and Florida; the species is known from Jamaica, but I have seen no specimens from there; on the mainland, *monima* is found in Central America and northern South America. In the M.C.Z. there are 34 specimens from Oriente and Sta. Clara (Soledad); the U.S.N.M. specimens are from Oriente and the Isle of Pines.

### 81. EUNICA PUSILLA FAIRCHILDI subsp. nov.

*Eunica pusilla*: Godman & Salvin, *Biologia*, 1, p. 228 (1883), (*partim*: Cuba).

The upper side of both wings is uniform, dark purplish brown, except for a small indistinct white spot between  $R_{4-5}$  and  $M_1$ . On the under side, the pattern is very similar to that of *E. habanae*. The ground color is dark grey, with an indistinct whitish spot near the base of the  $M_1$ - $M_2$  area of the forewing, similar subapical spots between  $R_3$ - $R_{4-5}$  and  $M_1$ , and another in about the middle of the  $M_3$ - $Cu_1$  area. There are some blue and purple scales near the apex of the forewing. The pattern of the hindwing is essentially like that of *habanae*: the ground color purplish, crossed by a broken sub-basal line, a similar median line, a postmedian row of four spots surrounded by grey areas, and a submarginal line. Length of f.w., 15 mm.

*Pusilla* is much smaller than *monima*, and the forewing seems somewhat differently shaped; I have been unable to find any genitalic differences, however, in a series of dissections of both forms from several localities. The two seem to behave as separate species populations, however. The Cuban form of *pusilla* differs from Central American and Colombian specimens in being darker, with the markings of the under side heavier, especially the lines of the hindwing and the blue scaling in the apex of the forewing. I have seen no Amazonian specimens (the type locality of *pusilla*) but the Cuban form does not agree very well with the original description and figure.

*Dist.* The type is a single male from La Milpa, Cienfuegos Bay, Sta. Clara, VIII-10-1932, Bates and Fairchild.

### 82. EUNICA MACRIS HERACLITUS

*Eunica heraclitus*: Herrich-Schäffer, 1864b, p. 162; Gundlach, 1881, p. 52.

*Eunica macris heraclitus*: Seitz, V, p. 485, pl. 100Ad (1915).

This species differs from its Cuban congeners in the lighter wing color, which shows no reflection at all, and in the other characters pointed out in the key. Length of f.w., 27 mm.

I can find no description of this species previous to that given by Gundlach (1881), hence the name is ascribed to him. The name is a *nomen nudum* in the various catalogues of Herrich-Schäffer, Kirby, and so forth; the reference to Poey, often cited, is incorrect, and I can find no Eschscholz description. The name, in this sense, does not appear in Sherborn's Index.

*Dist.* *Macris* is essentially a Brazilian insect, and I know of no Central American relatives; the Cuban form, however, seems very similar. In the M.C.Z. there are 3 specimens labelled "Cuba." Gundlach states that it is common in certain localities: near Habana, Vuelta-Abajo, Trinidad, and the Sierra Maestra to the south of Bayamo.

#### Genus XXXVI. DYNAMINE Hübner

Genotype, *Papilio mylitta* Cramer.

The nomenclature of the species of this genus seems to be in an unusually complete muddle, so that it has been impossible to be sure of the names of the two Cuban forms, although both are common and well known species.

#### *Key to species*

1. Upper side with white spots and bands (females) ..... 2  
     Upper side metallic green or blue, no white (males) ..... 3
2. H.w. above with one broad white median band ..... 83. *D. egaea*  
     H.w. above with two rather narrow white bands, one basal and one discal ..... 84. *D. mylitta*
3. F.w. above with a black patch between veins Cu<sub>1</sub> and Cu<sub>2</sub>.  
     ..... 84. *D. mylitta*  
     F.w. above immaculate green except for a dark subapical band.  
     ..... 83. *D. egaea*

#### 83. DYNAMINE EGAEA ZETES (?)

*Nymphalis zetes* Ménéttriés, 1834, p. 128, pl. 11, f. 1, 2.

*Nymphalis serina*: Poey, 1847, p. 49; *id.*, 1852, p. 198.

*Eubagis serina*: Herrich-Schäffer, 1864b, p. 162.

*Dynamine serina*: Gundlach, 1881, p. 47.

*Dynamine zetes*: Röber in Seitz, V, p. 508, pl. 101Ai (1915).

The under side is largely white, in both sexes, with some brown lines and bands, and two blue-pupiled eyespots on the hindwing. Above, the sexes are very different, as pointed out in the key. Length of f.w., 18-21 mm.

*Met.* Gundlach found the larva on "pringa-moza" (*Platygyňa hexandra*).

*Dist.* This species is found only on the Antilles. The type locality of *egaea* (Fabricius, 1775, p. 496; *serina*, *l.e.*, p. 497) is Jamaica; Cuban specimens differ from Jamaican ones both in appearance and in the structure of the male genitalia. I have been unable to examine specimens from Hispaniola (type locality of *zetes*), so I do not know whether these will agree with the Cuban specimens or not.

There are 31 specimens in the M.C.Z. from Oriente and Sta. Clara (Soledad).

#### 84. DYNAMINE MYLITTA BIPUPILLATA

*Nymphalis postverta*: Poey, 1847, p. 49; *id.*, 1852, p. 198.

*Eubagis postverta*: Herrich-Schäffer, 1864b, p. 162.

*Dynamine postverta*: Gundlach, 1881, p. 46.

*Dynamine mylitta* ab. *bipupillata* Röber in Seitz, V, p. 507 (1915).

The forewing of the female has five or six white spots in the apical half, while *egaea* has only the broad, interrupted, median white band and two small spots near the outer margin. The male is much more heavily bordered with black above than the male of *egaea*. The under side is similar to that of the preceeding species. Length of f.w., 20 mm.

*Dist.* This species ranges over most of tropical America. There is only a single male in the M.C.Z., from Habana; this agrees well with specimens from northern Central America, to which I apply the name *bipupillata*. Röber published this name as an MS aberration of Staudinger's (!), without locality; we have, however, a specimen from Guatemala, typical of the Central American choromorph, purchased from Staudinger under this name, hence I assume that this was the application intended for *bipupillata*. The species is probably confined to the western end of Cuba.

#### Genus XXXVII. ADELPHA Hübner

Genotype, *Papilio mesentina* Cramer



## 85. ADELPHA IPHICLA IPHIMEDIA

*Nymphalis basilea*: Poey, 1847, p. 48.

*Heterochroa basilea*: Herrich-Schäffer, 1864b, p. 161.

*Adelpha basilea*: Gundlach, 1881, p. 29.

*Adelpha iphicle iphimedia* Fruhstorfer in Seitz, V, p. 523 (1915).

*Adelpha iphicle*: Holland, 1916, p. 493.

The wings above are dark grey, crossed by a broad pearly-white median band, which begins at  $M_3$  of the forewing and almost reaches the anal angle of the hindwing. There is an orange subapical bar on the forewing, and a similar small anal spot on the hindwing. The wings are lighter on the under side, with numerous brown wavy lines; the white band of the upper side is repeated. Length of f.w., 24–31 mm.

*Met.* Gundlach found the larva on "Digame" (*Calycophyllum candidissimum*).

*Dist.* This species is found almost everywhere in the tropics of the American continent, whence Fruhstorfer has described many subspecies. The Cuban choromorph—the only one known from the Antilles—seems quite distinct from any of the continental forms. There are 25 specimens in the M.C.Z. from Oriente, and Sta. Clara (Soledad); in the U.S.N.M. there are specimens from Oriente and the Isle of Pines.

## Genus XXXVIII. DOXOCOPA Hübner

Genotype, *Papilio agathina* Cramer.

## 86. DOXOCOPA LAURE DRURYI

*Catargyria druryi* Hübner, Ex. Schm., 2, pl. 63, f. 1, 2, (182–).

*Nymphalis laura*: Poey, 1847, p. 46.

*Apatura laura*: Herrich-Schäffer, 1864b, p. 163.

*Apatura druryi*: Gundlach, 1881, p. 61.

*Chlorippe druryi*: Röber in Seitz, V, p. 547, pl. 110Be (1916).

The male has the wings brown above, with a broad median orange band and a small orange apical patch on the forewing, and a narrower median white band on the hindwing. The disc of the hindwing and the base of the forewing show purple reflections. On the under side the ground color is silver, with various markings. The female is much larger, lighter in color, with a white median band on both wings, and a round, light brown subapical spot on the forewing. It resembles the male on the under side. Length of f.w., ♂ 27–28 mm.; ♀ 31–36 mm.

*Met.* Gundlach found the larva on "Jía" (*Cascaría*).

*Dist.* This species is found in most parts of tropical America; the males of *druryi*, a choromorph known only from Cuba, are similar to those of the Central American *laure*, the females are more distinct. The Central American form is reported from Jamaica, but it is apparently rare and little known there; the only species of the genus found in Hispaniola (*thoë*) is very distinct.

In the M.C.Z. there are 25 specimens from Oriente and Sta. Clara (Soledad).

### Genus XXXIX. ASTEROCAMPA Röber

Genotype, *Apatura celtis* Boisduval & Leconte, by present designation.

*Celtiphaga* Barnes & Lindsey, genotype *Apatura celtis* Bdv. & Lec.

#### 87. ASTEROCAMPA LYCAON IDYJA

*Doxocopa idyja* Hübner, Ex. Schm., 3, pl. 9, 2 figs, (?1834); Herrich-Schäffer, 1864b, p. 163; Gundlach, 1881, p. 62.

*Nymphalis idyja*: Poey, 1847, p. 46.

*Asterocampa lycaon idyja*: Röber in Seitz, V, p. 549 (1916).

The ground color of the wings varies from dark grey to light brown. The outer margin of the forewing of the male is deeply excavated between veins  $M_2$  and  $Cu_2$ , making the wing quite falcate: a character that is not so prominent in the female. The postmedian row of six or seven small round dark spots between the veins of the hindwing, both above and below, is perhaps the most characteristic mark of the species. Length of f.w., ♂ 27–30 mm.; ♀ 33–40 mm.

*Met.* Gundlach found the larva on "Agracejo de sabána" (*Ardisia cubana*); most species of the genus feed on *Celtis*.

*Dist.* This form seems to be limited to Cuba and Hispaniola. Fruhstorfer (1912, p. 14) separated the Hispaniolan form as a new subspecies, *padola*, but specimens from that island in the M.C.Z. fall well within the range of variation of Cuban specimens. The species occurs also in the southern United States and Central America. In the M.C.Z. there are 9 specimens from Oriente and Sta. Clara (Soledad); the U.S.N.M. has specimens from Oriente and the Isle of Pines.

### Genus XL. PREPONA Boisduval

Genotype, *Papilio demodice* Boisduval.

## 88. PREPONA ANTIMACHE CRASSINA

*Nymphalis demophon*: Poey, 1847, p. 45.

*Prepona demophoon*: Herrich-Schäffer, 1862, p. 119; *id.*, 1864b, p. 161.

*Prepona amphiloë*: Gundlach, 1881, p. 33.

*Prepona antimache crassina* Fruhstorfer, 1904, p. 126; *id.*, in Seitz, V, p. 555, pl. 111c (1916).

This striking species cannot be confused with anything else found in Cuba. The wings are black, with a bright metallic blue discal band on the hindwing, continued on the forewing from the inner margin to vein  $Cu_1$ ; there is also a small subapical blue patch on the forewing. The under side is grey, with various dark lines. Length of f.w., 42–47 mm.

*Dist.* This choromorph is limited to Cuba, but a very similar form is found in Hispaniola; the species has a wide range in the American tropics. In the M.C.Z. there are two specimens labelled "Cuba, Wright" (Oriente); the specimens in the U.S.N.M. are from Baracoa.

## Genus XLI. SIDERONE Hübner

Genotype, *Siderone ide* Hübner.

## 89. SIDERONE NEMESIS NEMESIS

*Papilio Nobilis Nemesis* Illiger, 1801, p. 203.

*Nymphalis ide*: Poey, 1847, p. 46.

*Siderone ide*: Herrich-Schäffer, 1864b, p. 161; Holland, 1916, p. 493.

*Siderone nemesis*: Gundlach, 1881, p. 32; Röber in Seitz, V, p. 577, pl. 116b (1916).

This is another very distinctive species, unlike anything else found in Cuba. The forewing is black, with a large bright red basal patch, and a red median band; the hindwing is black, with a red costal spot. On the under side, the species has a "dead-leaf" pattern. Length of f.w., 30–37 mm.

*Dist.* From the material before me, it would seem that specimens from Cuba and Hispaniola differ in various ways from continental specimens, hence the name *nemesis* may be restricted to them. Some form of the genus is found in almost every part of the American tropics; whether or not they all represent one species, however, is doubtful. In the M.C.Z. there are 14 specimens from Oriente and Sta. Clara; the U.S.N.M. has specimens from Oriente and the Isle of Pines.

## Genus XLII. ANAEA Hübner

Genotype, *Papilio troglodyta* Fabricius.

*Hypna* Hübner, genotype *Papilio clytemnestra* Cramer.

## Key to species

1. F.w. with a broad yellow median band; under side of h.w. with some silver spots ..... 90. *A. iphigenia*  
 Not so marked ..... 2
2. Upper side bright, with various dark lines and spots, including a submarginal row of large pale confluent spots on f.w.  
 91. *A. cubana*  
 Upper side dark, the base of the wings sometimes reddish; usually immaculate except for some black spots at the anal angle of h.w.  
 92. *A. verticordia*

## 90. ANAEA CLYTEMNESTRA IPHIGENIA

*Nymphalis clytemnestra*: Poey, 1847, p. 47.

*Hypna clytemnestra* var. *iphigenia* Lucas, 1857, p. 577; Herrich-Schäffer, 1862, p. 119; *id.*, 1864, p. 161; Gundlach, 1881, p. 33.

*Hypna iphigenia*: Röber in Seitz, V, p. 579, pl. 116d (1916).

The upper side is brown, with a broad yellow band and some subapical yellow spots on the forewing; the under side is mottled with brown, lavender and silver. The tail at  $M_3$  of the hindwing is well developed, slightly spatulate. The species is not likely to be confused with anything else. Length of f.w., 40–48 mm.

*Dist.* This species has a wide range in the American tropics; the choromorph *iphigenia* is known only from Cuba, and the species has not been reported from any of the other West Indian islands. There are 25 specimens in the M.C.Z. from Oriente and Sta. Clara (Soledad).

## 91. ANAEA TROGLODYTA CUBANA

*Nymphalis troglodyta*: Poey, 1847, p. 48.

*Paphia troglodyta*: Herrich-Schäffer, 1864b, p. 161.

*Anaea troglodyta*: Gundlach, 1881, p. 30.

*Perrhanaea cubana* Druce, 1905, p. 549.

*Anaea troglodyta cubana*: Röber in Seitz, V, p. 581, pl. 117d (1916).

The base of the wings above is reddish brown, while the outer half is light brown, marked off by dark lines on the forewing. The under side is light brown, marked with innumerable small dark spots—a "bark" pattern. Length of f.w., 40-43 mm.

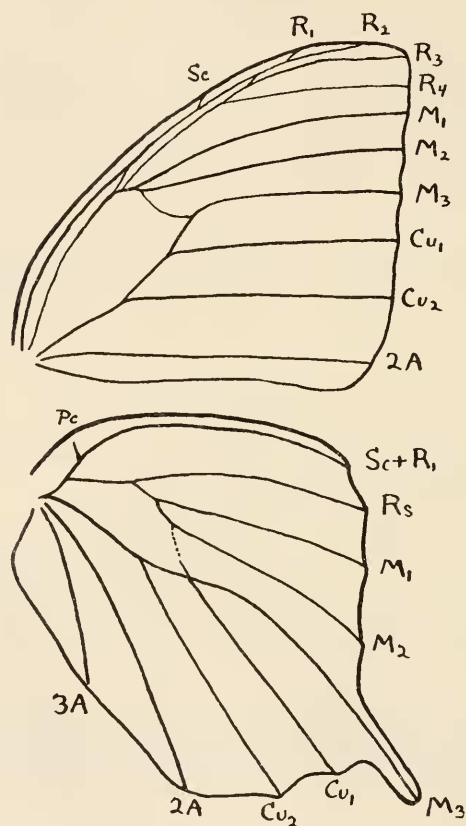


Fig. 13. *Anaea verticordia echemus*, venation.

*Met.* Poey found the larva on "Romero cimarron" (*Pectis*).

*Dist.* This form is presumably limited to Cuba; the name-type occurs in Jamaica and Hispaniola, and several choromorphs, probably belonging to this species, are found in the southern United States and

Central America. In the M.C.Z. there are 4 specimens from Oriente (Sierra-Maestra, 1000 ft., Querci); the U.S.N.M. specimens are from Santiago de Cuba. Gundlach found it in the vicinity of Cienfuegos (Sta. Clara).

## 92. ANAEA VERTICORDIA ECHEMUS

Fig. 13, venation.

*Cymatogramma echemus* Doubleday et al., Gen. Lep., p. 316, pl. 49, f. 4 (1850).

*Megalura poeyi* Lucas, 1857, p. 562.

*Paphia echemus*: Herrich-Schäffer, 1864b, p. 161.

*Anaea echemus*: Gundlach, 1881, p. 31; Röber in Seitz, V, p. 583, pl. 118d (1916).

The wings above are brown or sometimes reddish, at the base, becoming almost black toward the margins, except that the apex of the forewing is usually somewhat lighter. The under side has a finely reticulate pattern of dark brown; the hindwing is marked with two blue spots in a lighter area at the anal angle. Length of f.w., 24–30 mm.

*Met.* Gundlach found the larva on "Cuaba" (*Croton lucidus*).

*Dist.* Hübner's (Zuträge, III, p. 35, f. 559, 560) described *Anaea verticordia* from "Havannah," but the only specimen I have seen with the submarginal spots shown in his figure came from Hispaniola. The species is also known from the Bahamas and Dominica. In the M.C.Z. there are 35 specimens from Oriente and Sta. Clara (Soledad); the U.S.N.M. has specimens from Matanzas.

## Family VI. LIBYTHEIDAE

Opinions as to the relationship of the Libytheids with other butterfly groups are so various that it seems best here to avoid the problem by placing them in a separate family. The extraordinary palpi, longer than the thorax, will serve to distinguish the Cuban species from anything else.

## GENUS XLIII. LIBYTHEA Fabricius

Genotype, *Papilio celtis* Fuessly.

93. *LIBYTHEA CARINENTA MOTYA*

Fig. 14, venation.

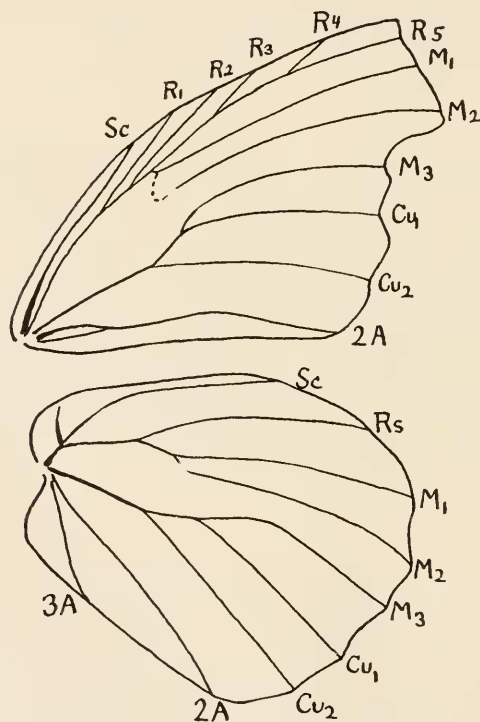
*Hecæрге motya* Hübner, Ex. Schm., 2, pl. 137, f. 1, 2 (182-).

*Libythea motya*: Poey, 1847, p. 177.

*Libythea terena*: Herrich-Schäffer, 1864b, p. 163; Gundlach, 1881, p. 70; Kaye, 1926, p. 476.

*Hypatus carinenta* var. *motya*: Pagenstecher, 1901, p. 15; *id.*, 1911, p. 11.

*Libythea carinenta motya*: Seitz, V, p. 623, pl. 120De (1916); Hering, 1921, p. 285, pl. 2, f. 3.

Fig. 14. *Libythea carinenta motya*, venation.

The forewing is whitish toward the inner margin, tinged with russet in the cell, with the apical half of the wing very dark brown, enclosing three white spots. The hindwing is whitish, darker on the margins. On the under side the markings of the upper side are repeated on the



forewing; the hindwing has a fine reticulate pattern. Length of f.w., 20-25 mm.

*Met.* The form found in the United States lives on *Celtis* in the larval stage.

*Dist.* This species ranges over the entire American continent, and many forms have been described. The only West Indian specimens that I have seen are from Cuba, so I do not know how widely the form *motya* may range. Kaye considers the Cuban, Hispaniolan, Puerto Rican and Jamaican specimens to be the same, and he states that the type of *terena* (Godart, 1819, p. 170, 813) came from Puerto Rico. The description of *terena* seems to fit figures 3 and 4 of Hübner's plate (*l.c.*); I have used the name *motya* for the Cuban form, basing it on figures 1 and 2, on the principle of page precedence. If the two prove to be merely extreme varieties of the same choromorph, *terena* will become the name of the Cuban form.

In the M.C.Z. there are 18 specimens from Oriente, Sta. Clara and Habana.

## Family VII. RIODINIDAE

The almost total absence of this family in the Antillean region has been commented on in the introductory part of this paper. The group is a very large one, with many species in tropical America, but most of the forms seem to be rare and local.

### Genus XLIV. APODEMIA Felder & Felder

Genotype, *Lemonias mormo* Felder & Felder.

#### 94. APODEMIA CARTERI RAMSDENI

*Mesosemia ramsdeni* Skinner, 1912, p. 126; Seitz, V, p. 727 (1920); Stichel, 1930, p. 247.

The brownish-grey ground color, the black, yellow-encircled spot at the anal angle of the hindwing above, and the very long antennae (two thirds as long as the costa of the forewing) will distinguish this from any other Cuban butterfly. The upper side of the forewing is marked with a postdiscal line of whitish spots, of which only those nearest the costa are distinct, and with several broad dark lines in the

basal half of the wing. The hindwing has several (five in the Bahaman form) dark lines, and a prominent black anal spot, ringed with yellow. The under side is lighter grey, with the markings of the upper side repeated. Length of f.w., 15 mm.

*Dist.* The original description of *ramsdeni* applies to specimens of *Charis carteri* Holland (1902, p. 486) from the Bahamas, except that the hindwing of Bahaman specimens above is dark orange, with dark grey lines, while Skinner describes this wing in Cuban specimens as "blackish-brown." I have not had an opportunity to compare specimens from the two localities, and the status of the names must be regarded as uncertain.

*Ramsdeni* was described from a pair of specimens taken at La Yberia, 20 miles from Baracoa, Sept. 18, 1909; the types are in the A.N.S.P.

### Family VIII. LYCAENIDAE

The "blues" form a characteristic family, not likely to be confused with any of the other butterfly groups found in Cuba. Three or four species are very common roadside butterflies; most of the others are rather rare.

About a thousand "species" of Lycaenidae have been described from the Neotropical region, and almost nothing beyond the color pattern of the adults is known about any of them. Most of the species known from Cuba were originally described from that island, or from some other of the Antilles, so that there is little question about the application of the specific names. It has been impossible, however, to work out a system of trinomial nomenclature, such as has been used in the preceding families; only when the continental fauna has been thoroughly studied will it be possible to say whether the Cuban form should be called *Strymon martialis*, or *S. martialis martialis*, for example. The family at present, then, is of almost no use to either the zoögeographer or the student of evolution.

#### *Key to genera*

1. Antennae uniformly dark, gradually thickening toward the tip, so that there is no distinct club; abdomen entirely orange.

#### XIV. *Eumaeus*

Shaft of antennae ringed with white; a distinct, contrasting club present; abdomen usually grey or blue.....2

2.  $R_3$  and  $R_4$  stalked from cell of f.w.; h.w. without tails or filaments (Fig. 16, venation).....3  
 $R_4$  of f.w. absent,  $R_3$  being a simple vein; h.w. usually with delicate filamentous tails (Fig. 15, venation).....XLVI. *Strymon*
3. Eyes hairy; the cross-bars on the under side of h.w. extend over the base of the wing.....XLIX. *Leptotes*  
 Eyes naked; base of f.w. immaculate beneath.....4
4. Outer margin of h.w. beneath with a row of six metallic spots; antennae somewhat more than half as long as f.w.

XLVIII. *Brephidium*

H.w. beneath with only two metallic spots at the anal angle; antennae less than half as long as f.w.....XLVII. *Hemiargus*

### Genus XLV. EUMAEUS Hübner

Genotype, *Eumaeus minyas* Hübner.

#### 95. EUMAEUS ATALA

*Eumenia atala* Poey, 1832, no. 3, 3 figs.; *id.*, 1846, p. 386; Herrich-Schäffer, 1864b, p. 165.

*Eumaeus atala*: Gundlach, 1881, p. 80; Holland, 1916, p. 494; Draudt in Seitz, V, p. 745, pl. 146b (1919); Holland, 1931, p. 223, pl. 28, f. 22.

This striking butterfly is much the largest of the Cuban *Lycenids*. The ground color above is black, suffused with metallic bluish-green over most of the forewing and the disc of the hindwing in the male (this scaling is less extensive in the female) and with a marginal row of metallic blue spots on the hindwing. On the under side, the hindwing bears three rows of these blue spots, and a prominent orange patch on the inner margin, which matches the orange abdomen. Length of f.w., 22-24 mm.

*Met.* The larva lives on "Yuquilla" (*Zamia*) and other cycads.

*Dist.* This form is found in Florida, the Bahamas and Cuba; it is very local, but at times extremely abundant. In the U.S.N.M. there are specimens from Oriente (Cayamas, Baracoa) and the Isle of Pines.

### Genus XLVI. STRYMON Hübner

Genotype, *Strymon melinus* Hübner.

This genus, like *Papilio*, is a heterogeneous assemblage of forms, in no way comparable with the other butterfly genera. The oldest

generic name for this group is *Bithys* Hübner, but as *Strymon* in the wide sense will probably be made a *nomen conservandum*, there is no point in introducing the other term here.

In addition to the species listed here, *Thecla crethona* Hewitson (Jamaica) and *Thecla telea* Hewitson (Brazil) are listed as occurring in

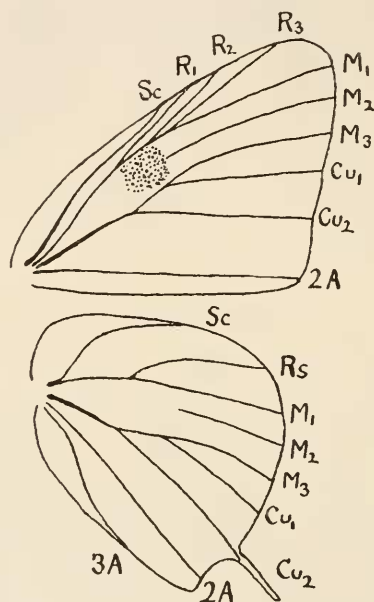


Fig. 15. *Strymon columella*, venation.

Cuba by Kaye (1926, p. 488). These species are both green below, similar to *macsits*, with which they may have been confused. The Cuban record of *Strymon tollus* (Lucas) seems to be authentic, but I have been unable to place it in the key from the meagre description; it is listed with the doubtful species at the end of the paper. Very likely thorough collecting will disclose additional species of *Strymon* on the island.

#### Key to species

1. Upper side of both wings with fulvous patches.....2
- Upper side not so marked—grey or blue.....3

2. F.w. beneath with two dark lines, prominently edged with white;  
h.w. beneath marked with red in the postmedian area.

99. *S. favonius*

Lines of f.w. beneath not marked with white; h.w. with some yellow  
in the postmedian area between veins  $M_3$  and  $Cu_2$ .

104. *S. angelia*

3. H.w. beneath with a submarginal spot of yellow, orange or red  
between veins  $Cu_1$  and  $Cu_2$ , sometimes with a black pupil. . . . . 4

H.w. beneath not so marked. . . . . 8

4. Only the tail at  $Cu_2$  is developed; there are two definite round black  
spots near the costal margin of h.w. below. . . 103. *S. columella*

Tails are present both at  $Cu_2$  and  $Cu_1$ ; no spots on costal margin  
of h.w. below. . . . . 5

5. Under side of h.w. with a solid, straight black and white median  
bar. . . . . 6

This bar incomplete, interrupted, or zig-zag. . . . . 7

6. H.w. and base of f.w. scaled with blue above; base of h.w. below  
immaculate; submarginal spot between tails black, surmounted  
by orange. . . . . 97. *S. martialis*

Wings brown above, h.w. with two small white spots near base be-  
low; submarginal spot between tails reddish, irregular, without  
a black pupil. . . . . 98. *S. acis*.

7. Under side of wings light, bluish, with several fine dark zig-zag  
lines. . . . . 102. *S. celida*

Under side dark, slate grey, with a single postmedian dark line on  
f.w., and the two usual median and postmedian lines on h.w.,  
interrupted on the veins.<sup>1</sup> . . . . . 96. *S. coelebs*

8. Disc of h.w. and costal half of f.w. beneath green. . . . . 9

No green; h.w. beneath with a brown, variegated, bark-like pattern.

105. *S. gundlachianus*

9. Postmedian line of f.w. below largely white; outer margin of h.w.  
bordered with brownish. . . . . 100. *S. simaethis*

Postmedian line of f.w. below largely black; the outer margin of  
h.w. bordered by a definite oval spot, blue toward the margin,  
becoming brown toward the base, where it touches the median  
line. . . . . 101. *S. maesites*

<sup>1</sup>Some females of 104., *S. angelia*, will trace here; they may be distinguished by their smaller size, and brownish grey upper surface, with no blue scaling.

## 96. STRYMON COELEBS

*Thecla coelebs* Herrich-Schäffer, 1862, p. 142; *id.*, 1864b, p. 164; Hewitson, Diurn. Lep., p. 156, pl. 62, f. 416, 417 (1874); Gundlach, 1881, p. 74; Draudt in Seitz, V, p. 779, pl. 155f, g (1920).

The base of the forewing and almost the entire hindwing above are blue. On the under side, the anal mark of the hindwing is black, margined with yellow above and blue on the side; the spot between the tails is yellowish, rather faded, with only a slight indication of the black pupil. Length of f.w., 15 mm.

*Met.* Gundlach found the larva living in the buds of a species of *Tetrapteris* ("Bejuco de San Pedro").

*Dist.* This species is recorded from Cuba, Hispaniola, and Puerto Rico. In the M.C.Z. there are 3 specimens from Sta. Clara (Soledad).

## 97. STRYMON MARTIALIS

*Thecla martialis* Herrich-Schäffer, 1864b, p. 164; Hewitson, Diurn. Lep., p. 156, pl. 62, f. 418, 419 (1874); Gundlach, 1881, p. 76; Holland, 1916, p. 495; Draudt in Seitz, V, p. 780, pl. 155g (1920); Holland, 1931, p. 236, pl. 30, f. 18.

*Eupsyche martialis*: Kaye, 1931, p. 535.

On the upper side, this species is black, with the base of the forewing and most of the hindwing blue; the anal lobe is touched with orange, and there is a small black submarginal spot between the tails. On the under side, the ground color is grey, with a white "hair-streak" on both wings. Length of f.w., 11-14 mm.

*Met.* In Florida, the larva has been found on *Trema micrantha*.

*Dist.* This species has been reported from most parts of the West Indies and Florida. In the M.C.Z. there are 2 specimens from Oriente (Sierra Maestra, 1000 ft., Querci) and Sta. Clara (Soledad). The U.S.N.M. specimens are from Habana and Santiago de Cuba.

## 98. STRYMON ACIS

*Papilio acis* Drury, 1770, p. 2, pl. 1, f. 2.

*Strymon mars* Hübner, Ex. Schm., 2, pl. 89, f. 1, 2, 3, 4 (182-).

*Thecla acis*: Draudt in Seitz, V, p. 798, pl. 158e (1920); Holland, 1931, p. 236, pl. 29, f. 38.

*Eupsyche acis*: Kaye, 1926, p. 490.

The wings above are brown, fringed with white; the hindwing has a small orange submarginal spot between the tails, and a touch of orange on the anal lobe. On the under side, the ground color is lighter, with the "hair-streaks" rather straight, heavily marked with white. Length of f.w., 14 mm.

*Dist.* This species has been recorded from Florida, Cuba, Jamaica and Dominica. I have seen no Cuban specimens.

#### 99. STRYMON FAVONIUS

*Papilio favonius* Abbot and Smith, 1797, p. 27, pl. 14.

*Thecla favonius*: Holland, 1916, p. 495; Draudt in Seitz, V, p. 798, pl. 158e (1920); Holland, 1931, p. 238, pl. 29, f. 22.

The ground color above is brown, with an irregular patch of orange about in the center of the forewing, and a similar submarginal patch near the anal angle of the hindwing. On the under side the ground color is similar, with two more or less broken, fine, black and white "hair-streaks" on each wing. Length of f.w., 16 mm.

*Met.* In the United States the larva has been found on oaks (*Quercus*).

*Dist.* Holland (1916) records a single badly rubbed specimen of this species from the Isle of Pines. It is common in the southern United States; I have seen no West Indian specimens, however.

#### 100. STRYMON SIMAETHIS

*Papilio simaethis* Drury, 1770, p. 3 pl. 1, f. 3.

*Thecla simaethis*: Herrich-Schäffer, 1864b, p. 165; Gundlach, 1881, p. 79; Draudt in Seitz, V, p. 798, pl. 158f (1920); Kaye, 1926, p. 488; Holland, 1931, p. 232, pl. 29, f. 39.

The upper side is uniform dark brown. On the under side, the ground color is light green, with a single, smoothly curved, white "hair-streak," thinly bordered with brownish red, on the forewing, and a similar, somewhat zig-zag, streak on the hindwing. The outer margin of the hindwing is rather broadly bordered with brown, irrorated with numerous whitish scales. Length of f.w., 11 mm.

*Dist.* This species is supposedly widely distributed in the American tropics, and it has been recorded from many parts of the West Indies. I have seen no Cuban specimens.



## 101. STRYMON MAESITES

*Thecla maesites* Herrich-Schäffer, 1864b, p. 165; Gundlach, 1881, p. 80.

On the upper side, the male is largely bright blue, while the female is black, with the base of the forewing and most of the hindwing dark blue. On the under side, the ground color is green, with an interrupted black "hair-streak" on the forewing, and a similar streak on the hindwing, outwardly margined with white toward the anal angle. The oval patch, mentioned in the key, is quite distinctive. Length of f.w., 11 mm.

*Dist.* Gundlach reports this species from Cuba and Puerto Rico. In the M.C.Z. there is a specimen from Oriente (Sierra Maestra, 1000 ft., Nov., Querci); Mr. S. C. Bruner kindly sent me a beautiful male taken in the vicinity of Habana.

## 102. STRYMON CELIDA

*Thecla celida* Lucas, 1857, p. 610; Hewitson, Diurn. Lep., p. 125, pl. 49, f. 246, 247 (1869); Gundlach, 1881, p. 79; Draudt in Seitz, V, p. 803, pl. 159b (1920); Kaye, 1931, p. 535, pl. 39, f. 10.

*Thecla aeon* ? : Herrich-Schäffer, 1864b, p. 165.

The upper side is blue, except for the black apical half of the forewing. On the under side, the ground color is light bluish-grey, with several fine, zig-zag, dark lines, and a small orange spot between the tails. Length of f.w., 10-12 mm.

*Dist.* This species has been recorded from Cuba and Jamaica. There is one specimen in the M.C.Z. from the Isle of Pines (March, W. R. Zappey), and one in the U.S.N.M. labelled "Cuba."

## 103. STRYMON COLUMELLA

Fig. 15, venation.

*Papilio columella* Fabricius, 1793, p. 282.

*Tmolus eurytulus* Hübner, Ex. Schm., 2, pl. 90, 4 figs. (182-).

*Polyommatus eurytulus*: Poey, 1846, p. 387.

*Thecla eurytulus*: Herrich-Schäffer, 1864b, p. 165.

*Thecla limenia*: Hewitson, Diurn. Lep., p. 160, pl. 63, f. 431, 432 (1874); Gundlach, 1881, p. 77.

*Thecla cybira* Hewitson, Diurn. Lep., p. 161, pl. 63, f. 435, 436 (1874); Gundlach, 1881, p. 77.

*Thecla bubastus eurytulus*: Draudt in Seitz, V, p. 809, pl. 145h (1920).

*Callicista columella*: Kaye, 1926, p. 489; *id.*, 1931, pl. 39, f. 15.

*Callicista bubastus eurytulus*: Kaye, 1931, p. 535, pl. 39, f. 13.

*Thecla columella*: Holland, 1931, p. 240, pl. 64, f. 35, 36.

The wings above are grey, with two or three dark spots at the anal angle of the hindwing, surrounded by blue scaling, which may cover most of this wing in the female. The under side is lighter grey, with three rows of small submarginal light spots, the inner row edged with black. The  $Cu_1$ - $Cu_2$  spot of the hindwing is black, surmounted by orange. Length of f.w., 11-14 mm.

I can find no grounds for recognizing more than one species among the collection of names given above—all based on West Indian specimens. In general, the names *eurytulus* and *cybira* have been used for females, *columella* and *limenia* for males, although the color characters used by various authors do not always split clearly on this line.

*Dist.* Specimens from Cuba, Hispaniola, Jamaica, the Bahamas and Florida seem to belong to the same form. The species has been reported from almost every part of the American tropics. In the M.C.Z. there are 102 specimens from Oriente, Sta. Clara (Soledad) and Habana.

#### 104. STRYMON ANGELIA

*Thecla hugo*: Herrich-Schäffer, 1862, p. 142; *id.*, 1864b, p. 165.

*Thecla angelia* Hewitson, Diurn. Lep., p. 162, pl. 63, f. 439, 440 (1874); Gundlach, 1881, p. 78; Draudt in Seitz, V, p. 809, pl. 145i (1920).

*Calycopis angelia*: Kaye, 1931, p. 535, pl. 39, f. 12.

The upper side of both wings in the male is light reddish brown, bordered with darker brown; the light brown is less extensive and duller in the female, sometimes entirely absent. On the under side the ground color is brown, with two dark "hair-streaks" on both wings. The basal (postdiscal) streak on the hindwing is bordered exteriorly with white; the spot between the tails is largely black, bordered with yellow. Length of f.w., 9-12 mm.

*Dist.* This species is known from Jamaica and Cuba. In the M.C.Z. there are 11 specimens from Oriente and Sta. Clara (Soledad); in the U.S.N.M. there are specimens from Oriente and Matanzas.

#### 105. STRYMON GUNDLACHIANUS sp. nov.

*Thecla sp.*: Gundlach, 1881, p. 441.

The forewing above is very dark, immaculate except for the stigma of the male; the hindwing is blue, except for the dark costal margin, and three or four dark spots between the veins on the outer margin. This blue scaling is less extensive in the female than in the male. On the under side, the forewing is grey, immaculate except for two wavy light lines near the outer margin; the hindwing is mottled with grey

and brown, forming a "bark" pattern, very different from the type of pattern found in the other Cuban species of the genus. Length of f.w., 10-11 mm.

This butterfly is closely related to the South American forms described as *bazochii* by Godart (1819, p. 681, Brazil); *thius* by Geyer (1832, Zutr., 4th Hndrd., p. 33, f. 743, 744, Brazil); *agra* by Hewitson (1873, Diurn. Lep., 3, p. 147, f. 369, 370, Amazon); and *infrequens* by Weeks (1901, Ent. News, 12, p. 265, Bolivia). These were all considered to be synonymous by Draudt (1920, in Seitz, V, p. 810, pl. 145i, k), but it seems to me that some at least will apply to distinct races. The Cuban form differs from all of these in having the upper side of the hindwing blue, not lavender; in that the subapical line of the forewing does not extend below  $M_3$ , although the submarginal line is complete along the outer margin; and in the intensity and details of the pattern of the under side of the hindwing.

*Dist.* I have not seen specimens from Hispaniola, whence Hall (1925, p. 189) recorded a species of this group as *Thecla bazochii*, and our only specimen from Jamaica, whence Kaye (1926, p. 490) recorded the species as *Callipsyche thius*, is too poor to tell whether it is the same as the Cuban form or not. Type and eight paratypes in the M.C.Z. from Oriente (Sierra Maestra, 1000 ft., June, July, Sept., Nov., Dec. collected by Querci).

## Genus XLVII. HEMIARGUS Hübner

Genotype, *Papilio hanno* Stoll.

### Key to species

1. Two blue-encircled black spots in the anal region of the hindwing below, of approximately equal size, the one between  $Cu_1$  and  $Cu_2$  surmounted by a prominent orange patch. . . . . 107. *H. ammon*  
Only the spot between  $Cu_1$  and  $Cu_2$  is developed; it is surrounded by a thin ring of yellow. . . . . 106. *H. filenus*

### 106. HEMIARGUS FILENUS

Fig. 16, venation.

- Polyommatus filenus* Poey, 1832, no. 13, 3 figs.; *id.*, 1846, p. 388; *id.*, 1852, p. 197 (as *philenus*).  
*Lycæna hanno*: Lucas, 1857, p. 614; Holland 1916, p. 495; Holland, 1931, p. 270, pl. 32, f. 3.  
*Lycæna filenus*: Herrich-Schäffer, 1864b, p. 164.  
*Cupido hanno*: Gundlach, 1881, p. 71.

The male is entirely lilac-blue above, the outer margins thinly bordered with fuscous. The female is almost entirely dark, with only a touch of blue at the wing bases. On the under side the sexes are similar: grey, with darker spots, usually ringed with light grey. Length of f.w., 8-11 mm.

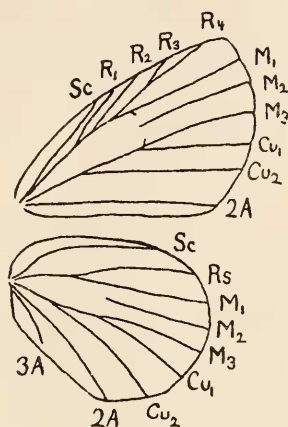


Fig. 16. *Hemiargus filenus*, venation.

*Dist.* West Indian specimens seem to be more heavily marked on the under side than specimens from the mainland, so I have retained the name *filenus* for this form, although it is probably at most but a choromorph of the continental *hanno* (Stoll, 1790, p. 170, pl. 39, f. 2, 2b). Specimens from Florida, the Bahamas, Cuba, Hispaniola and Jamaica seem to be the same.

In the M.C.Z. there are 87 specimens from Oriente, Sta. Clara (Soledad) and Habana.

#### 107. HEMIARGUS AMMON

*Lycaena ammon* Lucas, 1857, p. 612, pl. 16, f. 7, 7a, 7b; Herrich-Schäffer, 1864b, p. 164; Holland, 1916, p. 495.

*Cupido ammon*: Gundlach, 1881, p. 72.

*Hemiargus ammon*: Draudt in Seitz, V, p. 820, pl. 144k (1921).

Both sexes are largely blue above, but the females are more heavily bordered with black than the males, and are more variable. The two black spots of the under side are repeated above on the hindwing, as

is the spot of orange mentioned in the key. On the under side, this species is much like the preceding, but the markings are heavier, more contrasting. Length of f.w., 10–12 mm.

*Met.* Gundlach found the larva on “Brasilete” (*Caesalpinia*).

*Dist.* This form is found in Cuba and Hispaniola. Florida specimens differ somewhat from Cuban ones, and the corresponding Jamaican form (*dominica* Mösch., ? *catalina* Fabr.) is quite distinct. In the M.C.Z. there are 25 specimens from Oriente and Habana.

### Genus XLVIII. BREPHIDIUM Scudder

Genotype, *Lycaena exilis* Boisduval.

#### 108. BREPHIDIUM ISOPHTHALMA

*Lycaena isophthalma* Herrich-Schäffer, 1862, p. 141; *id.*, 1864b, p. 164; Holland, 1931, p. 272, pl. 32, f. 4.

*Cupido isophthalma*: Gundlach, 1881, p. 74.

*Brephidium isophthalma*: Draudt in Seitz, V, p. 820, pl. 144k (1921).

This is the smallest Cuban butterfly. The wings are dark above, blue toward the base. On the under side, the ground color is grey, with numerous short white lines, forming chain patterns. The row of metallic spots on the outer margin of the hindwing is quite distinctive. Length of f.w., 7 mm.

*Dist.* This form is known from Cuba, Florida and the Bahamas. In the M.C.Z. there are 4 specimens from Oriente (“Cuba, Wright”); I have seen specimens from Habana, collected by Mr. S. C. Bruner.

### Genus XLIX. LEPTOTES Scudder

Genotype, *Lycaena theonus* Lucas.

#### 109. LEPTOTES THEONUS

*Polyommatus cassius*: Poey, 1846, p. 387.

*Lycaena theonus* Lucas, 1857, p. 611, pl. 16, f. 8, 8a, 8b; Holland, 1916, p. 495; Holland, 1931, p. 272, pl. 32, f. 6.

*Lycaena cassius*: Herrich-Schäffer, 1864b, p. 164.

*Cupido cassius*: Gundlach, 1881, p. 73.

*Leptotes theonus*: Draudt in Seitz, V, p. 820, pl. 144l (1921).

The male is entirely lilac-blue above, with the dark markings of the under side showing through; the wings of the female are rather heavily

bordered with dark grey, and only the bases show blue reflections, the discal area of both wings being light grey. The under side is similar in the two sexes; the ground color is white, with various grey lines and spots, and with two black, blue-margined spots near the anal angle of the hindwing, the  $M_2$ - $M_3$  spot being much the larger. Length of f.w., 9-13 mm.

*Dist.* The exact range of this form cannot be determined from the material at hand; Jamaican, Cuban and Floridan specimens seem very similar, and probably Hispaniolan specimens will agree with these. *Theonius* is probably a choromorph of the South American *cassius*. In the M.C.Z. there are 77 specimens from Oriente, Sta. Clara (Sole-dad) and Habana.

### Family IX. HESPERIIDAE

The skippers form a well defined and easily recognized group of butterflies. They are usually rather small and dull, and in consequence they have been undeservedly neglected by most students of Lepidoptera. Almost no general work has been done on the metamorphosis of the family, and it is perhaps partly on this account that their classification is in a very confused state.

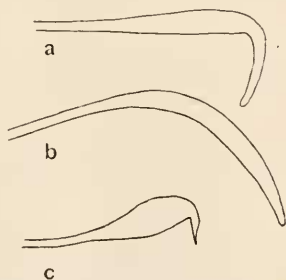


Fig. 17. Antennae of Hesperiidæ: a, *Polygonus lividus*;  
b, *Achlyodes papinianus*; c, *Atalopedes mesogramma*.

Skinner and Ramsden (1924) have published a list of the Cuban species of the family and Williams (1931) has given additional notes on many of the forms. The order of species and nomenclature adopted here follows that of Lindsey, Bell and Williams (1931) as far as possible; Mr. E. L. Bell kindly looked over my manuscript, making many valuable suggestions.

*Key to genera*

1. Vein  $M_2$  of f.w. not curved at base, usually about intermediate between  $M_1$  and  $M_3$  (Figs 18-21); mid tibiae without spines; males often with a costal fold (stippled area in fig. 21), never with a stigma. (*Pyrginae*) .....2  
     Vein  $M_2$  of f.w. curved at base, arising nearer to  $M_3$  (Figs. 22-24), or if straight, the mid tibiae are spined; males often with a stigma on f.w. (stippled area in figs. 22, 24), never with a costal fold. (*Hesperinae*) .....10
2. H.w. with a long tail. ....LI. *Goniurus*  
     H.w. not tailed; at most lobed .....3
3. Antennal club hooked, the recurved part differentiated from the rest in form or color, forming an apiculus. (Fig. 17a).....4  
     Antennal club evenly rounded, not hooked. (Fig. 17b).....8
4. Discocellular vein of f.w. between  $M_3$  and  $M_2$  very long and curved—more than twice as long as the vein between  $M_2$  and  $M_1$ ; under side of h.w. purplish black, with some blue lines.  
     L. *Phocides*  
     Lower discocellular of f.w. not so long; no bright blue spots or lines on under side of h.w. ....5
5. Dorsum of thorax fuscous, concolorous with wings; outer margin of h.w. slightly lobed at veins  $M_3$  and  $Cu_1$ , not lobed at the anal veins. ....LV. *Cabares*  
     Dorsum of thorax usually with some green, blue or orange hairs; outer margin of h.w. evenly rounded, or lobed at the anal angle. ....6
6. F.w. with three small subapical spots and three large discal spots, the discal spots forming a triangle. (Fig. 18, venation.)  
     LIII. *Polygonus*  
     F.w. immaculate, or with a discal row of four or more spots; never with only three separated spots in this area. ....7
7. Body and base of wings above with orange or fulvous scales, or discal area of under side of h.w. with silvery white markings.  
     LII. *Proteides*  
     Body and base of wings above with green or blue scaling, or at least a few greenish hairs on thorax; no white markings in discal area of h.w. below. ....LIV. *Telegonus*
8. Club of antenna long, slender, not distinctly flattened, less than twice as thick as shaft (fig. 17b); outer margin of f.w. excavated at  $R_1$  (fig. 20).....LVI. *Achlyodes*  
     Club of antenna twice as thick as shaft, at least in one direction; outer margin of f.w. evenly rounded. ....9



9. Upper side of both wings checkered with white spots.

LXI. *Pyrgus*

Upper side, at least of h.w., entirely dark. (Genera LVII to LX.)

Key to species under . . . . . LVII. *Ephyriades*

10. Apiculus of antennae prominent, about as long as the club is thick, or longer. . . . . 16  
 Apiculus shorter than thickness of club, or absent, (In case of doubt, try both alternatives.) . . . . . 11  
 11. Club blunt, without an apiculus; abdomen projecting considerably beyond wing margins. . . . . LXII. *Ancyloxypha*  
 Club with an apiculus; body about even with outer margin of wings. . . . . 12  
 12. Antennae very short, scarcely longer than width of thorax; apiculus reduced to a minute point. . . . . LXIV. *Hylephila*  
 Antennae longer; apiculus discernable with unaided eye. . . . . 13  
 13. Under side of h.w. with a prominent median white or yellow band, perpendicular to the costa; male stigma large and thick. (Fig. 17c, antenna; 22, venation.) . . . . . LXV. *Atalopedes*  
 No such band on h.w.; male stigma long and narrow or absent. . . 14  
 14. Dark, fuscous species, with white spots on f.w.; no stigma in male.

LXXI. *Lerodea*

Ochraceous or fulvous species; no white spots on wings; stigma present in male . . . . . 15

15. Under side of h.w. bright, ochraceous . . . . . LXIII. *Adopaea*  
 Under side of h.w. dark, greyish, with scattered yellow scales; a discal row of light spots usually indicated. . . . . LXVI. *Polites*  
 16. Antennae less than half as long as f.w. . . . . 17  
 Antennae half as long as f.w. or longer. . . . . 21  
 17. F.w. apically produced, the outer margin in part concave; no stigma in male; f.w. usually with several—6 or 7—prominent white spots. (Fig. 23, venation.) . . . . . 18  
 F.w. with outer margin convex; stigma sometimes present; when white spots are present on f.w. they are usually only four in number and not strongly developed . . . . . 19  
 18. H.w. with three prominent white spots on disc above; mid tibiae spinose. . . . . LXXII. *Calpodetes*  
 No white spots on h.w. above; mid tibiae without spines.

LXXIII. *Prenes*

19. Large insects (f.w. 20 mm. or longer), wings dark orange, with heavy brown borders; no stigma in male; third joint of palpus prominent, projecting nearly 1 mm. beyond vestiture of second joint . . . . . LXX. *Pemiades*

Smaller species, f.w. less than 20 mm. long; ground color of wings dark; 3rd joint of palpus not so prominent; male with stigma . 20

20. Stigma of male complex, with a band of modified scales extending to the inner angle of f.w.; spots of f.w. in females ochraceous; under side of palpus grey, sometimes with a green tinge

LXVII. *Catia*

Stigma of male a black bar extending between veins 2A and the fork of  $M_3$  and  $Cu_1$ ; spots on f.w., if present, white; under side of palpus orange or yellow. . . . . LXIX. *Lerema*

21. Ground color of wings ochraceous; veins of h.w. prominently outlined with yellow beneath . . . . . LXXVIII. *Poanes*

Ground color fuscous or dark grey; under side of h.w. not marked on the veins. . . . . 22

22. F.w. with no light spots . . . . . 23

F.w. with various light or translucent spots . . . . . 24

23. 3rd joint of palpus long and erect; small and slender species.

LXXVII. *Godmania*

3rd joint of palpus small, hidden in vestiture of 2nd joint; large, strong species . . . . . LXXIV. *Asbolis*

24. Cell of h.w. open . . . . . 25

Cell of h.w. closed . . . . . 26

25. F.w. with a large spot across middle of cell; other spots of f.w. large and prominent. . . . . LXXVI. *Paracarystus*

Spots of f.w. small, indistinct; cell spot rarely present, at most a minute light dot. . . . . LXXI. *Lerodea*

26. H.w. immaculate above; male with an elongate, curved stigma on f.w. (Fig. 24, venation.) . . . . . LXXV. *Perichares*

H.w. with two or three translucent spots on disc; no stigma in male . . . . . LXXVIII. *Thracides*

## Genus L. PHOCIDES Hübner

Genotype, *Phocides cruentus* Hübner.

### 110. PHOCIDES BATABANO BATABANO

*Eudamus batabano* Lucas, 1857, p. 624.

*Erycides mancinus* Herrich-Schäffer, 1862, p. 143.

*Erycides, batabano*: Herrich-Schäffer, 1865, p. 56; Gundlach, 1881, p. 171.

*Phocides batabano*: Holland, 1916, p. 501; Draudt in Seitz, V, p. 851, pl. 165d (1921); Skinner & Ramsden, 1924, p. 308; Williams, 1931, p. 307; Shepard, 1931, p. 7.

This is a large black or dark purple butterfly, marked on the upper and under side of the hindwing with a variable amount of blue-green in the form of incomplete lines; this wing is distinctly lobed. There are several rows of small bluish green spots on the under side of the body; the palpi are white beneath. Length of f.w., 27-30 mm.

*Met.* The larva has been found on mangrove (*Rhizophora mangle*) in Florida.

*Dist.* This form is limited to Cuba; specimens from Florida and the Bahamas belong to a distinct choromorph. The U.S.N.M. has specimens from Oriente (Tanamo) and the Isle of Pines; there are specimens in the Bell collection from Oriente (Santiago de Cuba).

## Genus LI. GONIURUS Hübner

Genotype, *Papilio proteus* Linnaeus.

*Eudamus* Swainson, genotype *Papilio proteus* Linn.

### Key to species

1. Upper side of body and base of wings clothed with long green hairs . . . . . 113. *G. proteus*  
     No such green vestiture . . . . . 2
2. H.w. underneath with whitish zig-zag lines, giving a sort of marbled appearance . . . . . 111. *G. marmorosa*  
     Under side lacking this whitish . . . . . 112. *G. santiago*

### 111. GONIURUS MARMOROSA

*Goniurus marmorosa* Herrich-Schäffer, 1865, p. 56; Gundlach, 1881, p. 171; Shepard, 1931, p. 29.

*Eudamus marmorosa*: Skinner & Ramsden, 1924, p. 308; Draudt in Seitz, V, p. 938 (1924) (mention).

"This is a very rare species. Above, it looks much like *santiago*, but the spots are more yellowish, and more lustrous; the two spots nearest the inner margin are nearer one another; the isolated spot is triangular (the base of the triangle forward). Underneath one sees, besides the blackish bands, whitish zig-zag lines, or patterns. Expanse, 38 mm." (Gundlach, 1881).

*Met.* Gundlach found a pupa on the leaves of "Guara" (*Cupania americana*).

*Dist.* Gundlach found the species only in the neighborhood of Habana; it seems not to have been captured in recent years. The only specimens that I have seen are some from the Poey collection, now in the A.N.S.P.

#### 112. GONIURUS DORANTES SANTIAGO

*Eudamus santiago* Lucas, 1857, p. 623; Holland, 1916, p. 500, pl. 31, f. 6; Skinner & Ramsden, 1924, pl. 308; Draudt in Seitz, V, p. 853, pl. 161a (1921); Williams, 1931, p. 307.

*Goniurus cariosa* Herrich-Schäffer, 1862, p. 142.

*Goniurus santiago*: Herrich-Schäffer, 1865, p. 56; Gundlach, 1881, p. 170.

*Goniurus corydon* Butler, 1870b, p. 492; *id.*, Lep. Ex., p. 65, pl. 25, f. 2 (1871).

*Goniurus dorantes* var. *santiago*: Shepard, 1931, p. 20.

This species is dark brown above, somewhat lighter near the bases of the wings, immaculate except for a few small translucent yellowish spots on the forewing. The under side of the hindwing, which is somewhat variable, is crossed by two irregular dark bands; the outer margin is often greyish. Length of f.w., 19-22 mm.

*Dist.* This species is found almost everywhere in the American tropics; there seems to be some confusion about the choromorphs in the West Indies; apparently *santiago* is the form in Cuba, the Bahamas and Hispaniola. There are 36 specimens in the M.C.Z. from Oriente, Sta. Clara (Soledad) and Habana. The U.S.N.M. specimens are from Oriente, Matanzas and the Isle of Pines.

#### 113. GONIURUS PROTEUS

*Papilio proteus* Linnaeus, 1758, p. 484.

*Hesperia proteus*: Poey, 1847, p. 244.

*Goniurus proteus*: Herrich-Schäffer, 1865, p. 56; Gundlach, 1881, p. 169; Shepard, 1931, p. 14.

*Edamus proteus*: Holland, 1916, p. 500; Skinner & Ramsden, 1924, p. 308; Draudt in Seitz, V, p. 853, pl. 160b (1921); Williams, 1931, p. 307; Holland, 1931, p. 331, pl. 45, f. 6.

This striking skipper may be easily distinguished from anything else found in the West Indies by the green color of the body and base of the wings above, and the long tails. Length of f.w., 19-25 mm.

*Mct.* The larva has often been described, as it is a pest of cultivated beans in many countries; it is likely to be found on almost any of the Leguminosae. Gundlach bred it from "Conchitas" (*Clitorea*) and "Marrullero" (*Phascolus*) in Cuba.

*Dist.* This species is abundant almost everywhere in the American tropics. In the M.C.Z. there are 31 specimens from Oriente, Sta. Clara (Soledad) and Habana.

### Genus LII. PROTEIDES Hübner

Genotype, *Papilio mercurius* Fabricius.

*Epargyreus* Hübner, genotype *Papilio tityrus* Fabricius.

#### *Key to species*

1. Segments of abdomen narrowly bordered with white on the caudal margins . . . . . 116. *P. sanantonio*  
     Abdomen above uniform brown . . . . . 2
2. Wings above with a discal band of golden yellow spots  
     . . . . . 115. *P. asander*  
     Wings above uniform brown except for the basal lighter brown  
     hairs, a narrow white fringe, and two tiny subapical spots and  
     a similar costal spot, both or either of which may be absent  
     . . . . . 114. *P. maysi*

### 114. PROTEIDES EXADEUS MAYSI

*Eudamus maysi* Lucas, 1857, p. 627.

*Goniloba egeus* Herrich-Schäffer, 1862, p. 142.

*Goniloba maysi*: Herrich-Schäffer, 1865, p. 53; Gundlach, 1881, p. 156.

*Epargyreus maysi*: Holland, 1916, p. 501, pl. 31, f. 11, 12; Skinner & Ramsden, 1924, p. 309; Draudt in Seitz, V, p. 861, pl. 166e, f (1922); Williams, 1927, p. 264; *id.*, 1931, p. 308.

*Epargyreus exadeus* var. *maysii*: Shepard, 1931, p. 49.

This insect is very similar to *P. sanantonio* on the upper side. The two species are quite different on the under side, but somewhat variable in both cases: in *maysi* the silvery white band on the disc of the hindwing, characteristic of the *Epargyreus* group, is represented to a varying degree, whereas in *sanantonio* the white is limited to shading on the brown markings. Length of f.w. 30-32 mm.

*Dist.* This species occurs almost everywhere in the tropics of continental America; the form *maysi* has been recorded only from Cuba. In the M.C.Z. there are three specimens from Oriente and the Isle of Pines.

## 115. PROTEIDES ASANDER

*Eudamus asander* Hewitson, 1867, Descr. Hesp., p. 9 [not seen].

*Epargyreus asander*: Holland, 1916, p. 502; Skinner & Ramsden, 1924, p. 309; Draudt in Seitz, V, p. 861, pl. 166f (1922).

*Aguna asander*: Williams, 1927, p. 288; Shepard, 1931, p. 35.

The discal band of translucent yellow spots on the forewing and the silvery white band on the under side of the hindwing will serve to distinguish this species from any of its Cuban allies. Length of f.w., 30 mm.

*Dist.* I have seen no Cuban specimens of this species, and I know of no record except that of Holland, from the Isle of Pines. It has also been reported from Hispaniola and Jamaica, as well as from most tropical parts of the continent, under a variety of names; the various choromorphs have never been thoroughly studied, and without specimens it is impossible to guess what form might occur in Cuba.

## 116. PROTEIDES MERCURIUS SANANTONIO

*Eudamus sanantonio* Lucas, 1857, p. 626.

*Goniloba sanantonio*: Herrich-Schäffer, 1865, p. 53; Gundlach, 1881, p. 156.

*Proteides idas sanantonio*: Holland, 1916, p. 502, pl. 31, f. 1, 2; Draudt in Seitz, V, p. 862, pl. 167a (1922).

*Proteides sanantonio*: Skinner & Ramsden, 1924, p. 309; Williams, 1931, p. 308.

*Proteides mercurius sanantonio*: Williams, 1927, p. 291.

*Proteides mercurius* var. *sanantonio*: Shepard, 1931, p. 54.

The upper side of this species repeats almost exactly the pattern of *maysi*: the thorax and base of the wings clothed with golden brown hairs, the rest of the wing surface uniform dark brown, except for one or two tiny white spots on the costal margin of the forewing. The under side is somewhat different, as described under *maysi*. Length of f.w., 27-32 mm.

*Met.* Kaye (1926, p. 492) found the larva of the Jamaican form on "tree-like Papilionaceae, also *Cassia*."

*Dist.* This species ranges from the southern United States to the Argentine; *sanantonio* is known only from Cuba, but other choromorphs occur in Jamaica and Hispaniola. In the M.C.Z. there are 9 specimens from Oriente and Sta. Clara (Soledad); in the U.S.N.M. and in the Bell collection there are specimens from Oriente and Habana; Holland recorded it from the Isle of Pines.

## Genus LIII. POLYGONUS Hübner

Genotype, *Polygonus lividus* Hübner.

*Acolastus* Scudder, type *Hesperia savigny* Latreille.

*Nennius* Kirby, new name for *Acolastus*, preoc.

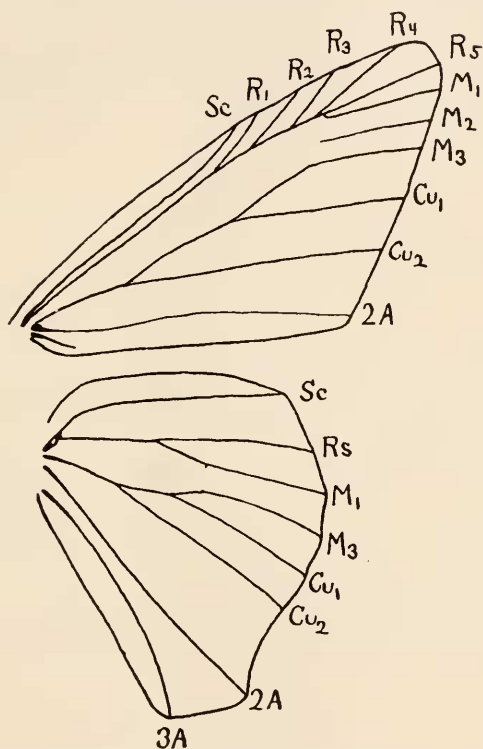


Fig. 18. *Polygonus lividus*, venation.

## 117. POLYGONUS LIVIDUS

Fig. 17a, antennal club; 18, venation.

*Polygonus lividus* Hübner, Ex. Schm., 2, pl. 144, 4 figs, (182-); Williams, 1927, p. 290; *id.*, 1931, p. 308; Shepard, 1931, p. 56.

*Hesperia savigny*: Poey, 1847, p. 245.

*Goniloba savignyi*: Herrich-Schäffer, 1865, p. 54.

*Goniloba amyntas*: Gundlach, 1881, p. 159; *id.*, 1891, p. 458.

*Nennius amyntas*: Holland, 1916, p. 502; Skinner & Ramsden, 1924, p. 309.

*Acolastus amyntas*: Draudt in Seitz, V, p. 862, pl. 146g (1922).

*Polygonus amyntas*: Holland, 1931, p. 328, pl. 49, f. 5.



This species may be recognized by the rather uniform purplish-brown ground color of the wings above, the lobed hindwing, and the three prominent translucent white spots on the disc of the forewing. Length of f.w., 21–25 mm.

*Met.* Gundlach found the larva on “Guamá” (*Lonchocarpus dominguenensis*); in Florida the host is *Piscidia piscipula*.

*Dist.* *P. lividus* has a wide range in the American tropics; it is found on all of the Greater Antilles. In the M.C.Z. there are 17 specimens from Oriente and Sta. Clara (Soledad); the U.S.N.M. has material from the Isle of Pines.

#### Genus LIV. TELEGONUS Hübner

Genotype, *Papilio talus* Cramér.

##### Key to species

1. Discal band of light spots across f.w. . . . . 118. *T. talus*  
     No spots on f.w. . . . . 2
2. Under side of f.w. with a bright patch of blue-green scales covering  
     the basal half of the cell . . . . . 121. *T. xagua*  
     No such patch; at most a few inconspicuous colored hairs at base  
     of wing . . . . . 3
3. Outer margin of h.w. on the under side broadly bordered with white.  
     . . . . . 122. *T. habana*  
     No white on under side of wings . . . . . 4
4. Fringe of h.w. concolorous with wing, dark brown . . . 120. *T. jariba*  
     This fringe, in part at least, yellowish or whitish . . . 119. *T. cubanus*

#### 118. TELEGONUS TALUS

*Papilio talus* Cramer, Pap. Ex., 2, p. 122, pl. 176, f. D (1777).

*Hesperia talus*: Poey, 1847, p. 244.

*Eudamus sumadue* Lucas, 1857, p. 625.

*Goniloba talus*: Herrich-Schäffer, 1865, p. 53; Gundlach, 1881, p. 158.

*Goniurus talus*: Skinner & Ramsden, 1924, p. 309; Draudt in Seitz, V, p. 860,  
 pl. 166d (1922).

*Telegonus talus*: Williams, 1927, p. 268, f. 7; *id.*, 1931, p. 309; Shepard, 1931,  
 p. 58.

This species is easily distinguished from its Cuban relatives by the distinctly green vestiture of the body and basal part of the wings—

a coloration strikingly similar to that of *G. proteus*. The forewing is crossed obliquely by a row of five translucent yellow spots. Length of f.w., 25 mm.

*Met.* Gundlach found the larva on "Yamao" (*Guarea guara*).

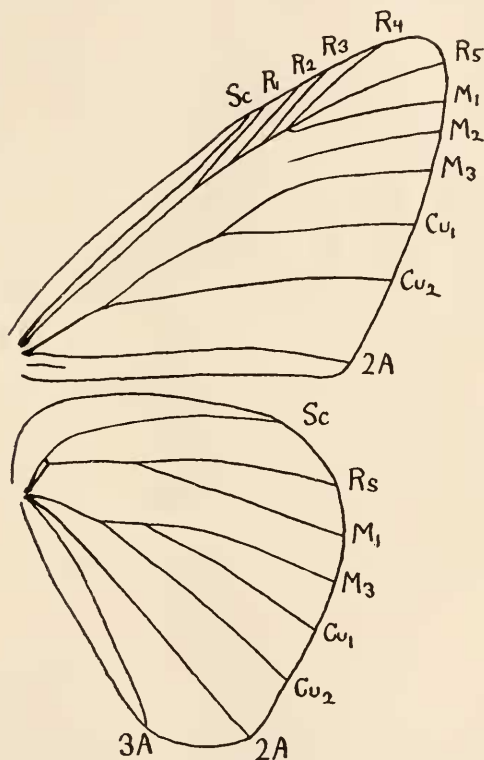


Fig. 19. *Telegonus alardus habana*, venation.

*Dist.* This species ranges from Mexico to Brazil on the continent, and it has been reported from all of the islands of the Greater Antilles; no choromorphs have been described, and our material is insufficient to determine whether any exist. In the M.C.Z. there is one specimen from Sta. Clara (Soledad); in the U.S.N.M. and in the Bell collection there are specimens from Oriente.

119. *TELEGONUS ANAPHUS CUBANUS*

*Telegonus alpistus* var. *cubana* Mabilie & Boulet, 1912, p. 77; Skinner & Ramsden, 1924, p. 310.

*Telegonus alpistus cubana*: Draudt in Seitz, V, p. 863 (1922).

*Telegonus cubana*: Williams, 1927, p. 281, pl. 24, f. 5; *id.*, 1931, p. 308; Shepard, 1931, p. 63.

The thorax and base of the hindwing are clothed with olive green hairs; otherwise the wings are immaculate, fuscous; the fringe of the hindwing is light, contrasting with the ground color. On the under side there is a faint pattern, composed mostly of scattered yellow scales. Length of f.w., 28 mm.

*Dist.* This species has a wide range in the American tropics; *cubanus* has been recorded from Cuba, Jamaica, Hispaniola and St. Thomas. In the M.C.Z. there is a single specimen, labelled "Cuba;" there are three specimens in the U.S.N.M. from Oriente (Alto del Cedro, Santiago).

120. *TELEGONUS JARIBA JARIBA*

*Achlyodes cassander*: Herrich-Schäffer, 1865, p. 52.

*Aethilla jariba* Butler, 1870b, p. 496; *id.*, Lep. Ex., p. 111, pl. 40, f. 3 (1872).

*Goniloba cassander*: Gundlach, 1881, p. 155.

*Thymeles vespasius* var. *cassander*: Gundlach, 1881b, p. 113.

*Telegonus geronae* Holland, 1916, p. 503.

*Telegonus jariba*: Skinner & Ramsden, 1924, p. 311; Draudt in Seitz, V, p. 863 (1922); Williams, 1927, p. 281; *id.*, 1931, p. 309; Shepard, 1931, p. 65.

*Telegonus vespasius*: Shepard, 1931, p. 70 (*partim*).

This species is similar to *cubanus*, but the blue scaling on the wings is confined to a few hairs at the base of the forewing, which may be absent. The thorax is clothed with dark blue scales, sometimes almost black. The under side is very dark, almost immaculate except that the apex of the forewing of the female is sharply set off, darker. Length of f.w., 28–31 mm.

*Dist.* The bibliography of this species seems to be particularly complicated. I do not see how the Fabrician name *vespasius* (1793, p. 334) can apply, as yellow spots in the apex of the forewing are mentioned in the original description; the name, in any event, was based on a Jones drawing, and the West Indian material available to Jones seems always to have come from Jamaica. It is probable that the various Cuban records of *hahneli* Staudinger (Ex. Tagf., p. 291, 1888) apply to this species.

This choromorph is confined to Cuba; another has been described by Williams from Jamaica. In the M.C.Z. there are three specimens: a male from the Gundlach collection, a female from the Doll collection, which matches Butler's figure nicely, and a male apparently received by Weeks from Staudinger, under the name *hahneli*; all are labelled "Cuba." Specimens in the U.S.N.M. and the Bell collection are from Oriente (Jagua, Alto del Cedro, Santiago).

• 121. *TELEGONUS XAGUA*

*Eudamus xagua* Lucas, 1857, p. 627.

*Goniloba malefida* Herrich-Schäffer, 1862, p. 142.

*Goniloba jagua*: Herrich-Schäffer, 1865, p. 53; Gundlach, 1881, p. 157.

*Telegonus xagua*: Skinner & Ramsden, 1924, p. 310; Draudt in Seitz, V, p. 864, pl. 167d (1922); Williams, 1927, p. 282, f. 26, pl. 24, f. 7; *id.*, 1931, p. 308; Shepard, 1931, p. 65.

The thorax and base of the wings above are clothed with brilliant metallic blue scales; there is a similar patch on the base of the forewing below. The under side of the hindwing is immaculate, while in the next species (*habana*), the outer margin of this wing is bordered with white. Length of f.w., 24–28 mm.

*Dist.* This species is known only from Cuba. There are three specimens in the M.C.Z. from Oriente.

122. *TELEGONUS ALARDUS HABANA*

Fig. 19, venation.

*Eudamus habana* Lucas, 1857, p. 624.

*Goniloba habana*: Herrich-Schäffer, 1865, p. 54; Gundlach, 1881, p. 158; *id.*, 1891, p. 457.

*Telegonus habana*: Holland, 1916, p. 503; Draudt in Seitz, V, p. 864, pl. 167d (1922); Skinner & Ramsden, 1924, p. 310; Williams, 1927, p. 284, f. 27; *id.*, 1931, p. 308; Shepard, 1931, p. 65.

This beautiful insect may be easily recognized by the blue scaling over the basal half of the wings above, the white fringe, and the white border of the hindwing on the under side. Length of f.w., 26–32 mm.

*Met.* Gundlach found the larva on "piñon" (*Erythrina*).

*Dist.* This species is found from Bolivia to Mexico on the continent, and in Cuba and Hispaniola. The choromorph *habana* is limited to Cuba. In the M.C.Z. there are 22 specimens from Oriente and Sta. Clara (Soledad).

## Genus LV. CABARES Godman &amp; Salvin

Genotype, *Thanaos potrillo* Lucas.

## 123. CABARES POTRILLO POTRILLO

*Thanaos potrillo* Lucas, 1857, p. 641.

*Nisoniades potrerillo*: Herrich-Schäffer, 1864b, p. 172; Gundlach, 1881, p. 141; *id.*, 1891, p. 456.

*Cabares potrillo*: Godman & Salvin, *Biologia*, 2, p. 337, pl. 80, f. 24, 25, 26 (1894); Skinner & Ramsden, 1924, p. 313; Draudt in Seitz, V, p. 878, pl. 170f (1922); Holland, 1931, p. 338, pl. 50, f. 10; Williams, 1931, p. 309; Shepard, 1931, p. 118.

The wings are brown, the forewing with two well developed sub-apical spots, and a discal row of six spots, of which the third from the costa is curiously shaped like an L; the fifth and sixth spots are somewhat separated from the others, the fifth being much the largest of all. The hindwing is slightly lobed at veins  $M_3$  and  $Cu_1$ . Length of f.w., 17–20 mm.

*Met.* Gundlach (1891) described the larva, but failed to mention the food plant.

*Dist.* This species ranges over Central America, the West Indies and northern South America; specimens from the last region have been described as a distinct subspecies. In the M.C.Z. there are 2 specimens from Oriente.

## Genus LVI. ACHLYODES Hübner

Genotype, *Papilio busirus* Cramer.

*Eantis* Boisduval, genotype *Urbanus thraso* Hübner.

## 124. ACHLYODES THRASO PAPINIANUS

Fig. 20, venation.

*Hesperia papinianus* Poey, 1832, no. 4, 7 figs.; *id.*, 1847, p. 246.

*Achlyodes papinianus*: Herrich-Schäffer, 1865, p. 52; Gundlach, 1881, p. 145; *id.*, 1891, p. 457.

*Eantis papinianus*: Skinner & Ramsden, 1924, p. 314; Draudt in Seitz, V, p. 902, pl. 176c (1922); Williams, 1931, p. 311.

This is a rather large, dark brown species, marked with spots and lines of lighter brown. It is easily distinguished from the other Cuban skippers by the very convex outer margin of the forewing, the entire absence of white spots on the wings, and the prominent area of bluish scales on the outer margin of the under side of the hindwing. Length of f.w., 20–25 mm.

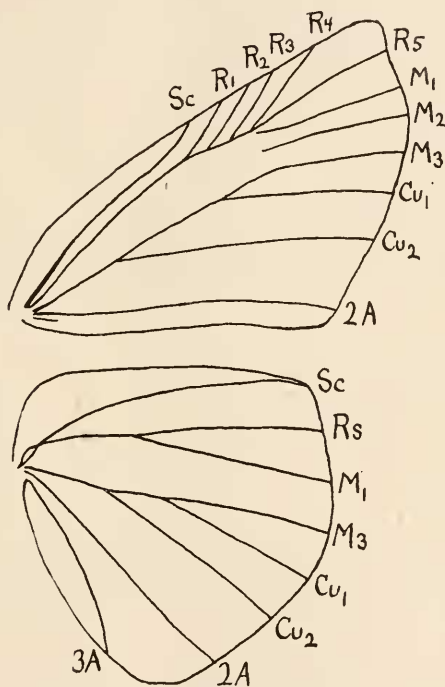


Fig. 20. *Achlyodes thraso papinianus*, venation.

*Met.* Poey figured the early stages, which were also described by Gundlach. The larva lives on "Ayúa" (*Zanthoxylum*) and probably also on *Citrus*.

*Dist.* This species is found from Texas to Paraguay on the continent, and on all of the islands of the West Indies. The choromorph *papinianus* seems to be limited to Cuba, although it has been reported

from other islands in the literature. In the M.C.Z. there are 9 specimens from Oriente; the U.S.N.M. specimens are from Oriente and Pinar del Rio.

### Genus LVII. EPHYRIADES Hübner

Genotype, *Papilio otreus* Cramer.

The species of this and the following three genera are somewhat difficult to distinguish, hence the Cuban forms have all been placed in the following key which, based as it is on superficial characters, may serve to facilitate their identification. The Cuban populations are not sufficiently well known to permit an analysis of their specific relationships with exotic choromorphs.

#### *Key to species of Ephyriades, Pholisora, Chionara, Erynnis*

1. F.w. with a uniform dark velvety ground color . . . . . 2  
     F.w. somewhat mottled, with lighter and darker areas . . . . . 6
2. Six or seven small white spots forming a sort of circle near the apex  
     of f.w. . . . . 125. *Eph. zephodes*  
     F.w. immaculate, or with spots otherwise arranged . . . . . 3
3. F.w. above with three small distinct subapical white spots, and with  
     two others in the median area . . . . . 127. *Eph. cubensis*  
     F.w. with no distinct spots, although the subapical ones may be  
     indicated . . . . . 4
4. Palpi below light grey . . . . . 129. *P. braco*  
     Palpi dark . . . . . 5
5. F.w. immaculate, velvety, with a purplish cast . . . . 126. *Eph. arcas*  
     Two tiny subapical light spots indicated on f.w.; no purple cast  
     to wings . . . . . 128. *P. concolor*
6. Palpi light grey beneath . . . . . 7  
     Palpi dark, not contrastingly colored . . . . . 8
7. F.w. with three subapical white spots above, and an additional  
     small spot between  $Cu_1$  and  $M_3$ . . . . . 129. *P. braco*  
     F.w. with nine or ten white spots in apical region above, including  
     one or two in cell . . . . . 125. *Eph. zephodes*
8. F.w. with no indication of subapical white spots . . . 130. *C. mithrax*  
     Subapical spots at least indicated . . . . . 9
9. Subapical spots distinct, usually four in number, or at least three  
     . . . . . 132. *Er. zarucco*  
     Subapical spots indistinct, never more than two present.  
     . . . . . 131. *Er. gesta*



## 125. EPHYRIADES ZEPHODES ZEPHODES

- Oileides zephodes* Hübner, Ex. Schm., 2, pl. 151, 4 figs. (182-).  
*Hesperia zephodes*: Poey, 1847, p. 246.  
*Nisoniades brunnea* Herrich-Schäffer, 1864b, p. 172; Gundlach, 1881, p. 142.  
*Melanthes otreus* var. *brunnea*: Holland, 1916, p. 504, pl. 31, f. 3, 4, 5.  
*Melanthes zephodes*: Draudt in Seitz, V, p. 918, pl. 178i (1923).  
*Ephyriades brunnea*: Skinner & Williams, 1923, p. 302.  
*Ephyriades otreus*: Skinner & Ramsden, 1924, p. 312; Shepard, 1931, p. 119.  
*Ephyriades zephodes*: Williams, 1931, p. 309; Shepard, 1931, p. 120.  
*Melanthes brunnea*: Holland, 1931, p. 348, pl. 50, f. 40, 41.

The male is uniform velvety dark brown above, except for a circle of tiny white subapical spots on the forewing. The female is more variegated, the subapical spots are larger, and there is an additional, elongate, spot between Cu<sub>1</sub> and Cu<sub>2</sub>. Length of f.w., 18-21 mm.

*Dist.* This form occurs in Florida, the Bahamas, Cuba and Hispaniola; the Jamaican choromorph is distinct. In the M.C.Z. there are 10 specimens from Oriente and Sta. Clara (Soledad); the U.S.N.M. has specimens from Habana.

## 126. EPHYRIADES ARCAS

- Papilio arcas* Drury, 1773, [p. 38], index, pl. 19, f. 5, 6.  
*Hesperia philemon*: Poey, 1847, p. 246.  
*Antigonus flyas*: Herrich-Schäffer, 1865, p. 52.  
*Antigonus arcas*: Gundlach, 1881, p. 147.  
*Brachycoryne arcas*: Skinner & Ramsden, 1924, p. 312; Wolcott, 1924, p. 149; Draudt in Seitz, V, p. 918, pl. 178i (1923).  
*Ephyriades arcas*: Williams, 1931, p. 309, f. 1; Shepard, 1931, p. 121.

The male of *arcas* is very easily distinguished from all other Cuban Hesperiidæ by its immaculate, velvety, dark brown upper side, usually with a purple cast. The male of *Pholisora braco*, which is similar, lacks the purple, and has the subapical spots at least indicated. Opinions differ about the female of this species; it may be indistinguishable from the female of *zephodes*, or it may be the form known as *cubensis*. Length of f.w., 18-22 mm.

*Met.* Gundlach stated that "the larva lives on Clavelito de Sabana (*Echites*), but it will probably live also on other species of Apocynaceae, as it is found in places where *Echites* does not grow." Wolcott bred this species from *Stigmatophyllum ligulatum* in Puerto Rico.

*Dist.* This species has been reported from various West Indian islands, and from Panama. In the M.C.Z. there is one specimen from Oriente (Torquino River).

#### 127. EPHYRIADES CUBENSIS

*Ephyriades cubensis* Skinner, 1913, p. 72; Skinner & Ramsden, 1924, p. 312; Williams, 1931, p. 318, pl. 27, f. 8; Shepard, 1931, p. 120.

The principal characters of this form are pointed out in the key. It is very possibly the female of *arcas*, as Williams has suggested. I have seen only the types, in the A.N.S.P., from Oriente (Yberia, twenty miles west of Baracoa, 2000 ft.). Length of f.w., 26 mm.

#### Genus LVIII. PHOLISORA Scudder

Genotype, *Papilio catullus* Fabricius.

The species of this group are included in the key under the preceding genus, *Ephyriades*.

#### 128. PHOLISORA CONCOLOR

*Nisoniades concolor* Herrich-Schäffer, 1864b, p. 172; Gundlach, 1881, p. 144.

*Bolla concolor*: Skinner & Ramsden, 1924, p. 313.

*Staphyllus concolor*: Williams, 1931, p. 317, f. 13, pl. 27, f. 2, 5.

This species looks very like the following, from which it may be most easily distinguished by the color of the palpi, which are dark, like the wing and body color, not light grey. There may be two or three subapical dots on the forewing, or these may be absent. Length of f.w., 15 mm.

*Dist.* This species is known only from Cuba. I have seen only the specimens in the A.N.S.P. from Oriente (Guantanamo), one of which was given to the M.C.Z.

#### 129. PHOLISORA BRACO

*Nisoniades braco* Herrich-Schäffer, 1864b, p. 171; Gundlach, 1881, p. 141.

*Nisoniades undulatus* Herrich-Schäffer, 1864b, p. 172.

*Bolla braco*: Skinner & Ramsden, 1924, p. 314.

*Staphyllus braco*: Williams, 1931, p. 311, f. 2, pl. 27, f. 13, 15.

The male of this species is very dark, quite immaculate above except for two or three tiny subapical spots. The female is different, with the ground color of the wings much lighter, more variegated, the subapical spots (three in number) well developed, usually with a small spot between  $M_3$  and  $Cu_1$ , sometimes with another between  $Cu_1$  and  $Cu_2$ . It may be easily distinguished from the *Erynnis* females by the white under side of the palpi. Length of f.w., 17–19 mm.

*Dist.* Apparently *braco* is found only in Cuba. In the M.C.Z. there are three specimens from Oriente (Torquino River) and Sta. Clara (Soledad); the U.S.N.M. has specimens from Oriente (Baracoa) and Matanzas.

### Genus LIX. CHIOMARA Godman & Salvin

Genotype, *Achlyodes mithrax* Möschler.

The single Cuban species is included in the key under genus LVII, *Ephyriades*.

#### 130. CHIOMARA MITHRAX

*Achlyodes mithrax* Möschler, 1878, p. 225.

*Cyclogypha gundlachi* Skinner & Ramsden, 1924, p. 314.

*Chiomara mithrax*: Draudt in Seitz, V, p. 913, pl. 177i (1923); Williams, 1931, p. 317.

This species may be distinguished from the other small, dark brown Cuban skippers by the two distinct velvety brown lines that cross its forewing: one, consisting of four partly distinct spots, starts at the lower third of the costa, runs almost straight to the inner margin; the other starts at a point about two thirds of the way out on the costal margin, curves outward, then back, to end on the inner margin at its outer third. Length of f.w., 17 mm.

*Dist.* This species ranges from Mexico to Brazil on the continent; it is only known from Cuba in the West Indies. The only Cuban specimen I have seen—the type of *gundlachi* in the A.N.S.P. from Guantanamo (Oriente)—differs from specimens from northern South America in only a few minor respects. Without more material it is impossible to be sure whether the Cuban population should be recognized as distinct or not.

## Genus LX. ERYNNIS Schrank

Genotype, *Papilio tages* Linnaeus.

The species are included in the key under genus LVII, *Ephyriades*.

## 131. ERYNNIS GESTA

*Thanaos gesta* Herrich-Schäffer, 1863, p. 142; Holland, 1931, p. 349, pl. 51, f. 1, 2.

*Achlyodes gesta*: Herrich-Schäffer, 1865, p. 52.

*Nisoniades gesta*: Gundlach, 1881, p. 145; *id.*, 1891, p. 456.

*Chiomara gesta*: Draudt in Seitz, V, p. 913, pl. 178a (1923); Skinner & Ramsden, 1924, p. 315.

*Erynnis gesta*: Williams, 1931, p. 312.

The forewing above presents a variegated pattern of different shades of dark brown; two minute subapical spots are usually present on the costa, often clearer on the under side than on the upper. Length of f.w., 14–17 mm.

*Met.* Gundlach (1891) found the larva on “añil” (*Indigofera*).

*Dist.* This species ranges from Mexico to Brazil on the continent, and it has been found on all of the Greater Antilles; no choromorphs have been recognized. In the M.C.Z. there are 20 specimens from Oriente and Sta. Clara (Soledad).

## 132. ERYNNIS ZARUCCO

Fig. 21, venation.

*Thanaos zarucco* Lucas, 1857, p. 641; Herrich-Schäffer, 1863, p. 140; Skinner & Ramsden, 1924, p. 314.

*Nisoniades juvenalis*: Herrich-Schäffer, 1864b, p. 172.

*Nisoniades jaruco*: Gundlach, 1881, p. 143.

*Thanaos terentius*: Holland, 1931, p. 354, pl. 48, f. 3.

*Erynnis zarucco*: Williams, 1931, p. 311.

The number of white spots on the upper side of the forewing is variable; the hindwing is immaculate fuscous above, although some marginal light spots are often indicated on the under side. The insect has a very distinctive habitus, and there is little likelihood of its being confused with any other Cuban species. Length of f.w., 20 mm.

*Met.* Gundlach described the larva, which he found on an exotic legume, *Scsbanca grandiflora*.

*Dist.* This species is found in Cuba and in the southern United States. In the M.C.Z. there are 9 specimens from Oriente and Sta. Clara (Soledad); there are specimens in the U.S.N.M. and in the Bell collection from Oriente, Matanzas and Pinar del Rio.

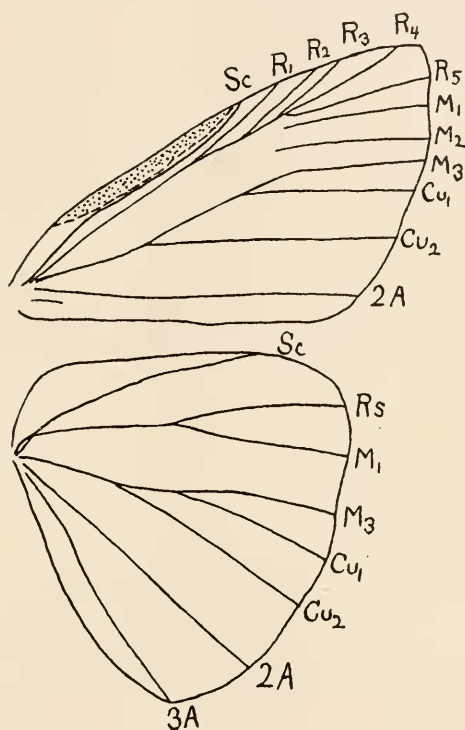


Fig. 21. *Erynnis zarucco*, venation.

# Genus LXI. PYRGUS Hübner

Genotype, *Papilio syrichtus* Fabricius.

## Key to species

1. White spots on wings well separated, small, rounded . . 134. *P. crisis*  
 White spots large, for the most part rectangular, tending to form  
 definite bands of contiguous spots . . . . . 133. *P. syrichtus*

## 133. PYRGUS SYRICTUS

*Papilio syrichtus* Fabricius, 1775, p. 534.

*Hesperia syrichtus*: Poey, 1847, p. 246; Holland, 1916, p. 506; Draudt in Seitz, V, p. 918, pl. 178k (1923); Skinner & Ramsden, 1924, p. 315; Holland, 1931, p. 341, pl. 50, f. 16, 17.

*Pyrgus orcus*: Herrich-Schäffer, 1864b, p. 171.

*Pyrgus syrichtus*: Gundlach, 1881, p. 139; Williams, 1931, p. 312.

The males have the base of the wings clothed with long whitish hairs, giving them a much lighter appearance than that of the females. As Williams has pointed out, the species varies in the coloring of the under side, depending on the season. Length of f.w., 12-16 mm.

*Mct.* Gundlach and others have bred this species from *Sida*, a common Malvaceous weed.

*Dist.* This is an exceedingly common species almost everywhere in the American tropics; it probably occurs in suitable places on all of the West Indian islands. In the M.C.Z. there are 33 specimens from Oriente, Sta. Clara (Soledad), Habana and the Isle of Pines.

## 134. PYRGUS CRISIA

*Pyrgus crisia* Herrich-Schäffer, 1864b, p. 171; Gundlach, 1881, p. 140; Williams, 1931, p. 312, pl. 27, f. 7, 9.

*Hesperia crisia*: Skinner & Ramsden, 1924, p. 315.

This little skipper is easily distinguished from the common *syrichtus* by its smaller size, and the general effect of black with small white spots—in *syrichtus* the white predominates. Length of f.w., 11 mm.

*Dist.* *Crisia* has been recorded from Cuba, Hispaniola and Puerto Rico. In Cuba it is rare and local. In the M.C.Z. there are two specimens from Oriente (Sierra Maestra, 1000 ft. Querci); the U.S.N.M. specimens are from Oriente (Santiago) and Habana.

## Genus LXII. ANCYLOXYPHA Felder

Genotype, *Hesperia numitor* Fabricius.

## 135. ANCYLOXYPHA NANUS

*Thymelicus nanus* Herrich-Schäffer, 1865, p. 52; Gundlach, 1881, p. 148.

*Ancyloxypha nanus*: Holland, 1916, p. 506; Draudt in Seitz, V, p. 928, pl. 180d (1923); Skinner & Ramsden, 1924, p. 316; Williams, 1931, p. 318, pl. 27, f. 14.

This is the smallest Cuban skipper, easily distinguished from any other species by the under side of the hindwing, which is yellowish, with the veins prominently outlined in black. Length of f.w., 8-9 mm.

*Dist.* This species is known only from Cuba. Gundlach records it from Pinar del Rio (San Cristóbal), Matanzas (Colon) and Oriente (Bayamo); Ramsden found it abundantly at Mayari, in Oriente, at 1500 ft.; and Holland has listed it from the Isle of Pines. There are two specimens in the M.C.Z. from Sta. Clara (near the coast, on Cienfuegos Bay); the U.S.N.M. has specimens from Baracoa (Oriente).

### Genus LXIII. ADOPAEA Billberg

Genotype, *Papilio thaumas* Hufnagel.

#### 136. ADOPAEA MAGDALIA

*Pamphila magdalia* Herrich-Schäffer, 1863, p. 143; *id.*, 1865, p. 53; Gundlach, 1881, p. 153.

*Adopaea magdalia*: Skinner & Ramsden, 1924, p. 316; Williams, 1931, p. 313.

*Thymelicus magdalia*: Draudt in Seitz, V, p. 932, pl. 181b (1924).

The ground color of both wings is bright ochraceous, with the veins outlined to a varying degree by dark brown. The outer margin of the forewing and the costal margin of the hindwing are rather heavily margined with brown, which also forms a narrow border on the outer margin of the hindwing. The sexes are similar except that the male has a narrow oblique stigma, which extends between veins 2A and Cu<sub>1</sub>, and that the female has the veins somewhat more strongly marked with brown, and the brown wing borders wider. Length of f.w., 9-11 mm.

*Dist.* This species is known from Cuba and Hispaniola. In the M.C.Z. there are 24 specimens from Oriente and Habana.

### Genus LXIV. HYLEPHILA Billberg

Genotype, *Papilio phyleus* Drury.

#### 137. HYLEPHILA PHYLEUS

*Papilio phyleus* Drury, 1770, 1, [p. 25], index, pl. 13, f. 4, 5, [1773].

*Hesperia phylaeus*: Poey, 1847, p. 245.

*Pamphila phyleus*: Herrich-Schäffer, 1865, p. 53.

*Pamphila philacus*: Gundlach, 1881, p. 150.

*Hylephila phylaeus*: Holland, 1916, p. 507; Draudt in Seitz, V, p. 928, pl. 180e (1923); Skinner & Ramsden, 1924, p. 316; Williams, 1931, p. 312; Holland, 1931, p. 377, pl. 46, f. 18, 19, pl. 47, f. 40.



The sexes of this species are somewhat differently marked. The male is ochraceous above, with brown indentations between the vein endings on the borders of both wings, and with a brown subapical spot on the forewing, and another surrounding the stigma. The stigma itself is oblique, slightly curved, narrow, extending between veins 2A and Cu<sub>1</sub>. The female is brown above, with ochraceous spots: three small subapical spots, and others of varying size across the disc of the forewing. The hindwing also has a discal row of spots, not clearly defined. A dark brown area between the two anal veins on the under side of the hindwing is characteristic of both sexes. Length of f.w., 15-17 mm.

*Mct.* In the United States the larva lives on various grasses, such as *Panicum*.

*Dist.* This insect ranges over a large part of temperate and tropical America; it is common almost everywhere within its range. It is polychoromorphic, but the various forms have not as yet been carefully worked out; specimens from the Greater Antilles are very similar to those from the Leeward Islands, whence came Drury's types. In the M.C.Z. there are 29 specimens from Oriente, Camagüey, Sta. Clara (Soledad) and Habana.

#### Genus LXV. ATALOPEDES Scudder

Genotype, *Hesperia huron* Edwards.

#### 138. ATALOPEDES MESOGRAMMA

Fig. 17c, antennal club; 22, venation.

*Hesperia mesogramma* Latreille, in Godart, 1819, p. 765; Poey, 1832, no. 14, 3 figs.; *id.*, 1847, p. 245.

*Hesperia alameda* Lucas, 1857, p. 649.

*Hesperia cunaxa* Hewitson, 1866, p. 488.

*Pamphila alameda*: Gundlach, 1881, p. 148.

*Atalopedes cunaxa*: Holland, 1916, p. 507, pl. 31, f. 14.

*Atalopedes mesogramma*: Skinner & Ramsden, 1924, p. 316; Draudt in Seitz, V, p. 931, pl. 1801 (1924); Riley, 1926b, p. 239; Williams, 1931, p. 313.

This species may be at once distinguished from all other Cuban skippers by the distinct white or light yellow band of the under side of the hindwing, which extends from vein Sc, to which it is perpendicular, to 2A. The ground color of the wings is brown, with ochraceous spots in the male, which tend to become white in the female, at least

on the forewing. The stigma of the male is broad at the base, between veins  $Cu_2$  and  $2A$ , tapering to end in a point at the fork of veins  $Cu_1$  and  $M_3$ . Length of f.w., 17-20 mm.

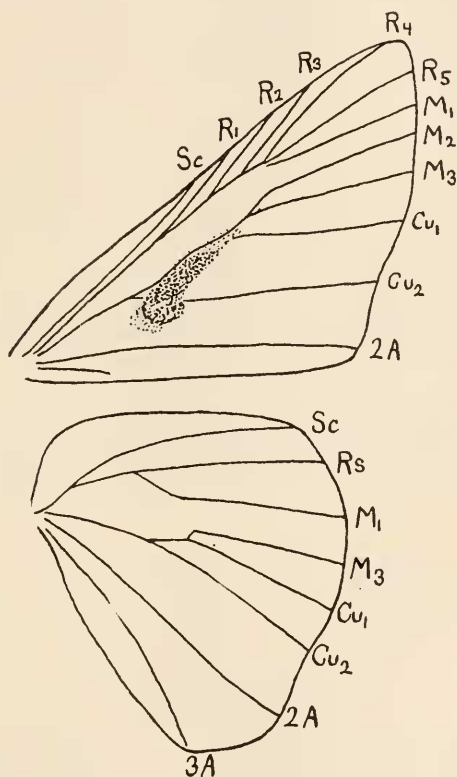


Fig. 22. *Atalopedes mesogramma*, venation.

*Dist.* This form is probably limited to Cuba and Hispaniola. In the M.C.Z. there are 25 specimens from Oriente, Camagüey, Sta. Clara (Soledad) and Habana.

#### Genus LXVI. POLITES Scudder

Genotype, *Hesperia peckius* Kirby.

139. *POLITES BARACOA*

*Hesperia baracoa* Lucas, 1857, p. 650.

*Pamphila amadis* Herrich-Schäffer, 1863, p. 142; *id.*, 1865, p. 53.

*Pamphila baracoa*: Gundlach, 1881, p. 152.

*Limochores baracoa*: Holland, 1916, p. 507, pl. 31, f. 15.

*Polites baracoa*: Skinner & Ramsden, 1924, p. 316; Draudt in Seitz, V, p. 932, pl. 181d (1924); Holland, 1931, p. 381, pl. 53, f. 21, 22; Williams, 1931, p. 313.

*Talides baracoa*: Lindsey, Bell & Williams, 1931, p. 100.

The ground color of the wings is brownish. The costal margin of the forewing, from the base to beyond the end of the cell, is ochraceous, as is a row of four spots that extends from the inner margin to the tip of the cell in the female; in the male these spots become fused to form an ochraceous area covering most of the disc of the wing. The under side is similar, except that the hindwing may have a discal row of spots, usually only faintly indicated in the male. Length of f.w., 10-12 mm.

*Dist.* This form is found in Florida, Cuba and Hispaniola; it may be a choromorph of the North American *themistocles*. In the M.C.Z. there are 52 specimens from Oriente, Camagüey, Sta. Clara (Soledad) and Habana.

Genus LXVII. *CATIA* Godman

Genotype, *Hesperia drury* Latreille.

140. *CATIA MISERA*

*Hesperia misera* Lucas, 1857, p. 649.

*Pamphila mago* Herrich-Schäffer, 1863, p. 143; *id.*, 1865, p. 53.

*Pamphila misera*: Gundlach, 1881, p. 153.

*Catia misera*: Holland, 1916, p. 507; Skinner & Ramsden, 1924, p. 317; Draudt in Seitz, V, p. 933, pl. 181e (1924); Williams, 1931, p. 315.

The male of this species is easily distinguished from any other Cuban skipper by the stigma and scent patch, described in the key to genera. The female resembles the female of *Lerodea tripuncta* somewhat, but it differs in having the spots of the forewing ochraceous, and in having no trace of a band on the underside of the hindwing. The under side of the head and thorax in both sexes tends to be greenish. Length of f.w., 13-14 mm.

*Dist.* *Misera* has been reported only from Cuba and the Bahamas. Some form of the genus occurs on every Antillean island, but the three principle forms, *misera*, *resuria* and *gemma*, seem sufficiently distinct to be called "species." In the M.C.Z. there are 39 specimens from Oriente, Sta. Clara (Soledad) and Habana.

### Genus LXVIII. POANES Scudder

Genotype, *Hesperia massasoit* Scudder.

#### 141. POANES RADIANS

*Hesperia radians* Lucas, 1857, p. 650; Herrich-Schäffer, 1863, p. 140.

*Pamphila radians*: Herrich-Schäffer, 1865, p. 53; Gundlach, 1881, p. 151.

?*Hesperia ammonia* Plötz, 1883, p. 201; Godman, 1907, p. 144.

*Hesperia magica* Plötz, 1883, p. 202; Godman, 1907, p. 144.

*Choranthus radians*: Skinner, 1920c, p. 186; Skinner & Ramsden, 1924, p. 319;

Draudt in Seitz, V, p. 941, pl. 182h (1924); Holland, 1931, p. 370, pl. 51, f. 47; Williams, 1931, p. 315, pl. 27, f. 1, 3, 4, 6.

*Choranthus radians* f. *bellus* Draudt in Seitz, V, p. 941, pl. 182k (1924).

*Poanes radians*: Lindsey, Bell & Williams, 1931, p. 113.

This little species may always be distinguished from any of the other Cuban forms by the under side of the hindwing which, in both sexes, is grey, with the veins prominently outlined in greenish-yellow, and with an orange area between veins 2A and Cu<sub>2</sub>. The male on the upper side is very similar to *Adopaea magdalia*: ochraceous, bordered with brown, with a narrow, linear stigma, extending from vein 2A to Cu<sub>1</sub> on the forewing. The female is larger, with heavier borders, and with the base of the forewing covered to a variable extent with brown. Length of f.w., 13-14 mm.

*Dist.* The only specimens of this species that I have seen are from Cuba; it has been reported from Florida, and similar forms, possibly choromorphs of this species, have been described from Hispaniola and St. Thomas. In the M.C.Z. there are 20 specimens from Oriente and Sta. Clara (Soledad).

### Genus LXIX. LEREMA Scudder

Genotype, *Papilio accius* Abbot & Smith.

## 142. LEREMA CORNELIUS

*Hesperia cornelius* Latreille, in Godart, 1819, p. 764; Poey, 1847, p. 245; Lucas, 1857, p. 648.

*Goniloba cornelius*: Herrich-Schäffer, 1865, p. 55; Gundlach, 1881, p. 167.

*Amblyscirtes insulae-pinorum* Holland, 1916, p. 508, pl. 31, f. 7, 8.

*Lerema cornelius*: Skinner & Ramsden, 1924, p. 317.

*Euphyes cornelius*: Riley, 1926b, p. 238.

*Tigasis cornelius*: Williams, 1931, p. 315.

The male is a uniform dark brown above, except for two or three inconspicuous light spots on the forewing. The stigma is large, dark, extending from vein 2A to the base of Cu<sub>1</sub> and M<sub>3</sub>. The under side is brown, with a variable number of spots on the hindwing, or with this wing immaculate. The female is similar, but usually it has the markings much better developed: on the forewing above and below there are two subapical spots, a large spot between Cu<sub>1</sub> and M<sub>3</sub>, and another between Cu<sub>2</sub> and Cu<sub>1</sub>. On the under side of the hindwing there is a discal row of white spots, although these tend to become obsolescent in some specimens. The palpi of both sexes are orange. Length of f.w., 16–19 mm.

*Dist.* This form has been found only in Cuba and the Bahamas. In the M.C.Z. there are 7 specimens from Oriente and Sta. Clara (Soledad).

## Genus LXX. PHEMIADES Hübner

Genotype, *Papilio phineus* Cramer.

## 143. PHEMIADES ANTIQUA ANTIQUA

*Pamphila antiqua* Herrich-Schäffer, 1863, p. 142; *id.*, 1865, p. 53; Gundlach, 1881, p. 150.

*Pheмиades antiqua*: Holland, 1916, p. 509, pl. 31, f. 10; Lindsey, Bell & Williams, 1931, p. 125.

*Pyrrhocalles antiqua*: Skinner & Ramsden, 1924, p. 318; Draudt in Seitz, V, p. 947, pl. 183f, g (1924); Williams, 1931, p. 315.

*Pyrrhocalles orientis* Skinner, 1920b, p. 152; Skinner & Ramsden, 1924, p. 319.

This striking species cannot be confused with anything else in the Cuban fauna. It is a large insect, with the basal and discal areas of the wings orange, broadly bordered with dark brown. The under side of the hindwing is ferrugineous, with markings faintly indicated. Length of f.w. (Haitian specimens), 23–24 mm.; (specimens from Oriente, Cuba), 20 mm.

*Dist.* The descriptions of Herrich-Schäffer and Gundlach apply to a large form with a row of ochraceous subapical spots on the forewing; the specimens on which these descriptions were based came from western Cuba. All of the specimens that I have seen from Hispaniola agree very well with this description, but the Cuban specimens studied are smaller and lack the subapical spots, agreeing with Skinner's description of *orientis*. I have seen no specimens from Pinar del Rio, and it may well be that specimens corresponding to the description of *antiqua* are found there, and that there are thus two choromorphs of this species on the island of Cuba. Jamaican specimens belong to a distinct choromorph. I have not seen the original description of *Hesperia utha* Hewitson (Descr. Hesp., 1868, p. 37), but the name is usually considered to be a synonym of *antiqua*.

In the M.C.Z. there are two specimens of this species from Oriente ("Cuba, Wright," presumably from the Sierra de Yateras), and a series from Hispaniola. The U.S.N.M. specimens are from Baracoa, Tanamo, Santiago (all Oriente) and the Isle of Pines: all agreeing with the form *orientis*.

#### Genus LXXI. LERODEA Scudder

Genotype, *Papilio accius* Abbot & Smith.

##### 144. LERODEA EUFALA

*Hesperia eufala* Edwards, 1869, p. 311.

*Cobalus dispersus* Gundlach, 1881, p. 154.

*Lerodea eufala*: Holland, 1916, p. 508; Skinner & Ramsden, 1924, p. 317;

Holland, 1931, p. 396, pl. 46, f. 33; Williams, 1931, p. 313; Lindsey, Bell & Williams, 1931, p. 134.

The under side of the palpus is white, of the thorax and abdomen white or light grey. The ground color of the wings is lighter than that of *tripuncta*, and the spots of the forewing are all white, never infuscated. Length of f.w., 12-13 mm.

*Dist.* This form is credited with a wide range in tropical and temperate America; our material, however, seems to indicate that the species is polychoromorphic. Cuban specimens agree very well with topotypical specimens from Florida, so the name *eufala* may safely be applied. The species has been recorded only from Cuba and Hispaniola in the West Indies.

In the M.C.Z. there are 12 specimens from Oriente, Sta. Clara (Soledad) and Habana.

## 145. LERODEA TRIPUNCTA

*Cobalus tripunctus* Herrich-Schäffer, 1865, p. 53; Gundlach, 1881, p. 154.

*Lerodea tripuncta*: Holland, 1916, p. 508; Skinner & Ramsden, 1924, p. 317;

Lindsey, Bell & Williams, 1931, p. 134.

*Megistias tripunctus*: Draudt in Seitz, V, p. 974, pl. 187k (1924); Williams, 1931, p. 313.

The wings are fuscous, the forewing with three very small subapical spots, and two slightly larger discal spots, sometimes partially infuscated or absent; the hindwing is immaculate. A discal row of small, faint spots can usually be seen on the under side of the hindwing. This species is very similar to *eufala*, but it is considerably darker. The proportionately longer antennae, which serve to separate the two species in the key to genera, form a reliable character. Length of f.w., 13-14 mm.

*Dist.* This is a common species in Cuba; it has been reported from Puerto Rico, and it undoubtedly also occurs in Hispaniola. Lindsey, Bell and Williams (1931) list *Megistias jamaca* of Schaus, from Jamaica, as a synonym. In the M.C.Z. there are 24 specimens from Oriente, Sta. Clara (Soledad) and Habana.

## Genus LXXII. CALPODES Hübner

Genotype, *Papilio ethlius* Cramer.

## 146. CALPODES ETHLIUS

*Papilio ethlius* Cramer, Pap. Ex., 4, p. 212, pl. 392, f. A, B (1782).

*Hesperia ethlius*: Poey, 1847, p. 244.

*Goniloba ethlius*: Herrich-Schäffer, 1865, p. 54; Gundlach, 1881, p. 160; *id.*, 1891, p. 457.

*Calpodes ethlius*: Skinner & Ramsden, 1924, p. 319; Draudt in Seitz, V, p. 944, pl. 183c (1924); Holland, 1931, p. 399, pl. 45, f. 3.

This well known skipper is not likely to be confused with anything else occurring in Cuba, unless it be the rare *Thracides telegonus*, to which it bears a striking superficial resemblance. The under side of the hindwing of *ethlius*, however, is uniform light brown, except for the three translucent discal spots, whereas *telegonus* has the basal half of the wing light, sharply distinct from the dark outer half.

The sexes are similar. The ground color of the wings is brown, with various translucent white spots: on the forewing there are two small



subapical spots, a similar spot between  $M_3$  and  $M_2$ , a larger spot between  $Cu_1$  and  $M_3$ , a prominent spot between  $Cu_2$  and  $Cu_1$ , and a smaller spot on 2A, as well as a spot in the cell. The hindwing has three prominent rectangular discal spots. Length of f.w., 24-26 mm.

*Met.* The larva lives on "Platanillo de Cuba" (*Canna*) and "sagú" (*Maranta*).

*Dist.* This is a common species everywhere in the American tropics, remarkably constant in pattern over its entire range; the type locality of the name is Surinam. It is crepuscular, and may be found on flowers at twilight. There are 2 specimens in the M.C.Z. from Oriente ("Cuba, Wright"); specimens were observed at Soledad, but not captured.

### Genus LXXIII. PRENES Scudder

Genotype, *Hesperia panoquin* Scudder.

#### Key to species

1. H.w. with a broad white band on the under side . . . 151. *P. corrupta*  
    H.w. with a few pale spots, or with diffuse shadings on the under  
    side . . . . . 2
2. Under side of h.w. with a row of white spots . . . . . 3  
    This surface immaculate, or with diffuse shadings . . . . . 4
3. Under side of h.w. with only three whitish spots.  
    149. *P. panoquinoides*  
    This wing with a row of six or seven such spots . . . 147. *P. sylvicola*
4. Two cell spots usually present on f.w.; under side of h.w. with  
    diffuse light shadings . . . . . 150. *P. nyctelius*  
    No spots in cell of f.w.; under side of h.w. immaculate, fuscous  
    148. *P. ocola*

### 147. PRENES NERO SYLVICOLA

Fig. 23, venation.

*Goniloba sylvicola* Herrich-Schäffer, 1865, p. 55; Gundlach, 1881, p. 166.

*Prenes sylvicola*: Skinner & Ramsden, 1924, p. 320; Williams, 1931, p. 315.

*Prenes nero* form *sylvicola*: Draudt in Seitz, V, p. 948, pl. 183i (1924).

This is the commonest of the Cuban species of *Prenes*. It is quite variable, but it may always be distinguished by the row of small white

spots on the under side of the hindwing, which never quite disappear, and by the spot on the forewing on vein 2A, which is always well developed in addition to the usual spots on the apical half of the wing. Length of f.w., 18-20 mm.

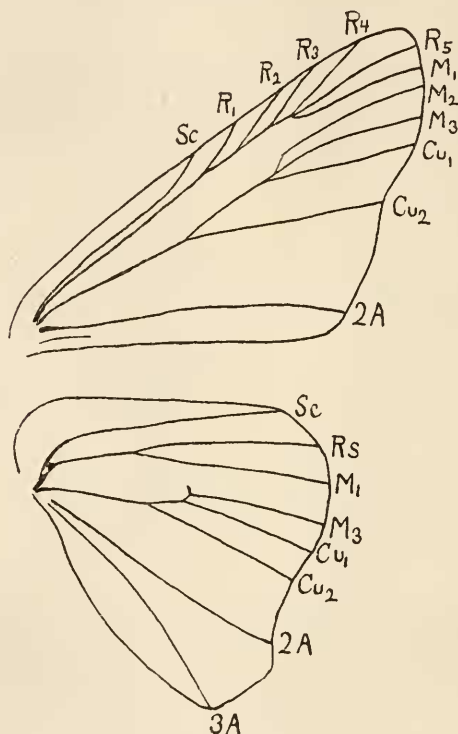


Fig. 23. *Prenes nero sylvicola*, venation.

*Met.* Gundlach found the larva on Para grass.

*Dist.* This form may occur in Florida as well as Cuba, but I have seen no Florida specimens. Hispaniola, Jamaica and other West Indian islands seem all to be inhabited by *nero*, which differs only slightly from *sylvicola*. Specimens from the continent (Central America) appear to be more like *nero* than like *sylvicola*.

## 148. PRENES OCOLA

*Hesperia ocola* Edwards, 1863, p. 20, pl. 11, f. 4.

*Prenes ocola*: Holland, 1916, p. 509; Skinner & Ramsden, 1924, p. 319; Holland, 1931, p. 398, pl. 46, f. 34, pl. 54, f. 22; Lindsey, Bell & Williams, 1931, p. 138.

This species is similar to *sylvicola*, but the band of spots on the under side of the hindwing is entirely lacking. The spot on 2A of the forewing is reduced or absent, and the other spots of this wing differ in shape in the two species. Length of f.w., 17 mm.

*Dist.* This species is credited with a very wide range in America. There is a specimen in the M.C.Z. from Puerto Rico, and the species will no doubt eventually be found on other West Indian islands. There is only one Cuban specimen in the M.C.Z. from Sta. Clara (Soledad); Holland has recorded it from the Isle of Pines.

## 149. PRENES PANOQUINOIDES

*Pamphila panoquinoides* Skinner, 1891, p. 175.

*Prenes panoquinoides*: Skinner & Ramsden, 1924, p. 319; Lindsey, Bell & Williams, 1931, p. 138.

The note in the key to species, "under side of hindwing with three whitish spots," was evidently made in the American Museum, with their Cuban specimens before me. The only specimen of the species in the M.C.Z., however, a male paratype from Texas, has no spots on the under side of the hindwing at all. The maculation of the forewing above is limited to two faint spots; below, the veins are faintly outlined with brown. Length of f.w., 12 mm.

*Dist.* This species was described from Florida (Key West) and Texas; there are two specimens in the A.M.N.H. from Pinar del Rio (Viñales and Cabañas).

## 150. PRENES NYCTELIUS COSCINIA

*Goniloba coscinia* Herrich-Schäffer, 1865, p. 54.

*Goniloba brettus*: Gundlach, 1881, p. 164.

*Prenes ares*: Skinner & Ramsden, 1924, p. 320.

*Prenes nyctelius*: Riley, 1926b, p. 234; Williams, 1931, p. 316.

The forewing has two or three small subapical spots; there are almost always two small cell spots, a small spot between  $M_3$  and  $Cu_1$ , and a larger, almost square spot between  $Cu_1$  and  $Cu_2$ . The base of

both wings above is clothed with rather long, olive green hairs. The under side of the head and body is whitish. Most distinctive is the under side of the hindwing; the basal area is whitish, the rest brown or grey, with a light shading across the discal area, indicating the spots of *sylvicola*. Length of f.w., 17-19 mm.

*Met.* Gundlach found the larva on grass, especially "Pará grass."

*Dist.* This species is found from Mexico to southern Brazil on the mainland, and on all of the Antillean islands. It shows remarkably little geographical variation, but West Indian specimens (Cuba, Hispaniola, Jamaica, St. Croix) have the light postdiscal shading of the under side of the hindwing somewhat narrower than continental specimens, and there are other small differences in the pattern of this wing. In the M.C.Z. there are 9 specimens from Oriente, Sta. Clara (Soledad) and Habana.

#### 151. PRENES CORRUPTA

*Goniloba corrupta* Herrich-Schäffer, 1865, p. 54; Gundlach, 1881, p. 165.

*Prenes corrupta*: Holland, 1916, p. 509, pl. 31, f. 13; Skinner & Ramsden, 1924, p. 320; Williams, 1931, p. 316.

*Prenes nero* form *corrupta*: Draudt in Seitz, V, p. 948, pl. 183h (1924).

The broad white band on the under side of the hindwing should serve sufficiently well to characterize this species; the upper side is similar to that of *sylvicola*. Length of f.w., 18 mm.

*Dist.* In the literature *corrupta* is recorded from many localities in the West Indies and Central America, but Mr. Bell tells me that the typical form is probably limited to Cuba. In the M.C.Z. there is a single specimen from Oriente ("Cuba, Wright"); in the U.S.N.M. there are specimens from Oriente (Santiago de Cuba) and the Isle of Pines.

#### Genus LXXIV. ASBOLIS Mabille

Genotype, *Eudamus capucinus* Lucas.

#### 152. ASBOLIS CAPUCINUS

*Hesperia cassander*: Poey, 1847, p. 245.

*Eudamus capucinus* Lucas, 1857, p. 625.

*Goniloba sandarac* Herrich-Schäffer, 1865, p. 54.

*Goniloba capucinus*: Gundlach, 1881, p. 163.

*Asbolis sandarac*: Holland, 1916, p. 509, pl. 31, f. 9; Draudt in Seitz, V, p. 944, pl. 183d (1924).

*Thymeles capucinus*: Draudt in Seitz, V, p. 867 (1922).

*Asbolis capucinus*: Skinner & Ramsden, 1924, p. 320; Williams, 1931, p. 316.

This is a large, very dark species, with no light markings at all on the upper side. The male has a narrow, curved stigma, that extends between veins 2A and Cu<sub>1</sub>, hardly differentiated from the rest of the wing in color. The wing bases are covered with some long brown hairs, and perfect specimens show purple reflections on the hindwing and body. On the under side, the base of the forewing is dark, while the apical half and the hindwing are ferrugineous. A light spot is usually indicated between 2A and Cu<sub>2</sub> of the forewing in the male; in the female there is usually an additional light area between Cu<sub>2</sub> and Cu<sub>1</sub>. Length of f.w., ♂, 22-23 mm.; ♀, 26-27 mm.

*Dist.* This species seems to be limited to Cuba; it is not closely related to any other known Antillean form. In the M.C.Z. there are 7 specimens from Oriente, and Sta. Clara (Soledad). The U.S.N.M. specimens are from Oriente and Habana.

#### Genus LXXV. PERICHARES Scudder

Genotype, *Papilio coridon* Fabricius.

#### 153. PERICHARES CORIDON CORIDON

##### Fig. 24, venation

*Papilio coridon* Fabricius, 1775, p. 533.

*Hesperia phocion*: Poey, 1847, p. 244.

*Eudamus trinitad* Lucas, 1857, p. 626.

*Goniloba corydon*: Herrich-Schäffer, 1865, p. 54; Gundlach, 1881, p. 162.

*Perichares corydon*: Skinner & Ramsden, 1924, p. 320; Draudt in Seitz, V, p. 995, pl. 192a (1924); Williams, 1931, p. 317.

This species may be distinguished by the yellow, translucent spots of the forewing: a large, curved cell spot, smaller spots between M<sub>3</sub> and Cu<sub>1</sub>, and Cu<sub>1</sub> and Cu<sub>2</sub>, a tiny spot, often absent, on 2A. There are no subapical spots, and no markings on the upper side of the hindwing. The stigma of the male is similar in position and shape to that of the preceding species. The hindwing, on the under side, is beautifully variegated with brown and violaceous; the under side of the abdomen is conspicuously marked with orange. Length of f.w., ♂, 22-23 mm.; ♀, 26 mm.

*Met.* Gundlach found the larva on Pará grass; the species is often listed as a sugar-cane pest, and it no doubt feeds on a wide variety of grasses.

*Dist.* This species has a wide range in tropical America; it is, however, definitely polychoromorphic, and the form *coridon* is probably limited to the Antilles. Cuban specimens show about the same

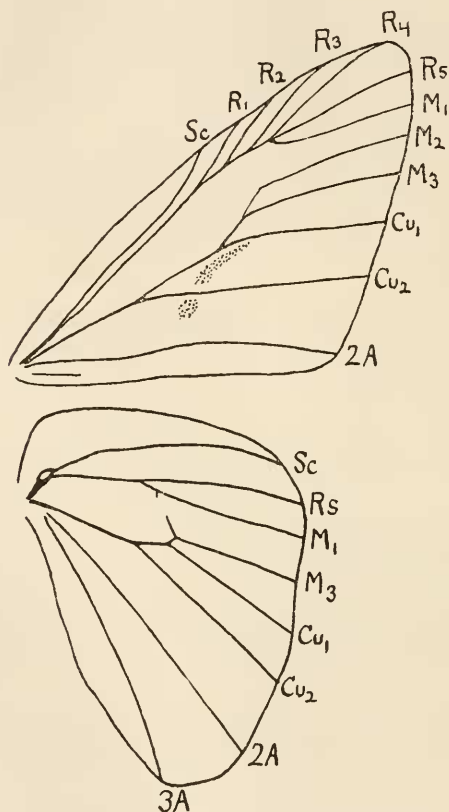


Fig. 24. *Perichares coridon coridon*, venation.

range of variation as those from Jamaica (the type locality). In the M.C.Z. there are 21 specimens from Sta. Clara (Soledad); it is probably common everywhere in Cuba, but generally overlooked because of its crepuscular habits.

## Genus LXXVI. PARACARYSTUS Godman

Genotype, *Cobalus hypargyra* Herrich-Schäffer.

## 154. PARACARYSTUS CUBANA

*Goniloba cubana* Herrich-Schäffer, 1865, p. 55; Gundlach, 1881, p. 166; *id.*, 1891, p. 458.

*Paracarystus cubana*: Skinner & Ramsden, 1924, p. 320; Williams, 1931, p. 318, pl. 27, f. 11.

The wings are brown, with three subapical spots on the forewing, a rather prominent, square cell spot, a similar spot between veins  $Cu_2$  and  $Cu_1$ , and a smaller one between  $Cu_1$  and  $M_3$ . Expanse, according to Gundlach, 44 mm.; Williams' figure shows the forewing to be about 20 mm. long.

*Met.* The larva lives on "Platanillo de Cuba" (*Canna*), according to Gundlach.

*Dist.* The only specimen of this species that I have seen is in the A.N.S.P., from the Poey collection.

## Genus LXXVII. GODMANIA Skinner &amp; Ramsden

Genotype, *Goniloba malitiosa* Herrich-Schäffer.

## 155. GODMANIA MALITIOSA

*Goniloba malitiosa* Herrich-Schäffer, 1865, p. 54; Gundlach, 1881, p. 165.

*Godmania malitiosa*: Skinner & Ramsden, 1924, p. 321; Williams, 1931, p. 317, f. 12, pl. 27, f. 10, 12.

*Cymaenes malitiosa*: Draudt in Seitz, V, p. 983, pl. 189e.

This is a rather fragile little skipper, uniform fuscous above in the female, marked slightly with ochraceous below on the hindwing and the costal margin of the forewing. The male has a peculiar fulvous band on the forewing along the inner margin, bent up toward the apex; it is developed to a variable degree in different specimens. Length of f.w., 14-15 mm.

*Dist.* This species is probably limited to Cuba; the Central American form passing under the same name seems quite distinct. In the M.C.Z. there are 6 specimens from Oriente and Sta. Clara.

## Genus LXXVIII. THRACIDES Hübner

Genotype, *Papilio phidon* Cramer.



## 156. THRACIDES TELEGONUS

*Papilio Plebeius Urbanus Telegonus* Esper, 1780, p. 33, pl. 56 (cont., 6), f. 3.  
*Thracides longirostris*: Skinner & Ramsden, 1924, p. 321.

The upper side of the only Cuban specimen that I have seen is a rather uniform dark brown, with several large yellowish hyaline spots on the forewing, including one in the cell, and two similar spots on the disc of the hindwing. The under side is similar, but somewhat lighter, on the forewing; the basal half of the hindwing is very light brown, sharply distinct from the dark outer half. Length of f.w., 20 mm.

The Esper name is the oldest applying to the choromorph complex commonly known as *Thracides longirostris* Sepp. The type locality of *telegonus* is doubtful; Esper mentions "the African coast and the hot lands of Asia." The first reviser of the genus will have to determine a probable locality; the Central American and Cuban form will probably then be described as a new subspecies, since all of the names available seem to apply to South American specimens. There seems to be no point in introducing a new name, however, until sufficient material is available for study.

*Dist.* There is a single specimen in the U.S.N.M. from Oriente (Baracoa, April); it is very similar to Central American specimens.

## DOUBTFUL SPECIES

## PAPILIO PALAMEDES Drury

Pocoy (1846, p. 234) reports that this species "was captured once some distance from Habana; I have only one very poor specimen in my collection." It is a fairly common insect in southern Florida, and an occasional specimen may well stray across the straits to Cuba. It is a large *Papilio*, resembling *polyxenes* more than any other Cuban species; it has two rows of yellow spots on the outer half of the forewing, the inner row fused to form a band, which does not enter the cell on the hindwing.

## PIERIS PROTODICE Boisduval &amp; Leconte

*Pieris rapae* Linnaeus is recorded from Cotorro, Provincia de Habana, in an anonymous note in the Mem. de la Soc. Cubana de Hist. Nat., 8, p. 34 (1934). Mr. S. C. Bruner informs me that his identification is an error, and that the species is really *P. protodice*.

## APPIAS PEREGRINA Röber

This species is discussed under the genus *Appias*. Röber, in the original description, compares it with *Appias ilaire*: "The upper surface is not glossy white, but strongly yellow, particularly on the hindwing, the proximal part of the costal margin of the forewing is more strongly blackened than in *ilaire* and the black border of the forewing is not extended to the inner angle. On the under side the basal half of the cell of the forewing is yellow and the hindwing has a subanal yellowish stripe from the base to the distal margin."

## METAMANDANA DIDO (Linnaeus)

There is a specimen of this species in the M.C.Z. labelled "Cuba, Wright;" it seems to be identical with Brazilian specimens, however, and I suspect that the locality label is erroneous. The species apparently does occur in Hispaniola, however, and it may yet be found in the Oriente of Cuba. It may be distinguished from any Cuban species except *Metamorphia stelenes* by the translucent green spots of the forewing; from *stelenes* it is easily separated by the elongate, *Colaenis*-like shape of the forewing.

## STRYMON TOLLUS (Lucas)

*Thecla tollus* Lucas, 1857, p. 611; Gundlach, 1881, p. 440.

I have not seen this species, and I have been unable to place it from the meagre descriptions of Lucas and Gundlach. Recent authors seem to have overlooked the name. Gundlach states "I have so far found only a single specimen of this species, from the region of Colon (Matanzas). The insect is brown, the base of the forewings and the disc of the hindwings are brilliant blue; the wings are ashy-brown on the under side, the forewings with a dark transverse line through the middle, the hindwings with a white line, bordered on the inside with black, angled toward the anal border. Between the tails there is a small cinnamon spot, and another, black, in the anal angle. Expanse, 27 mm."

## CALLIMORMUS FILATA (Plötz)

This species was described from "Cuba," from a specimen supposedly collected by Poey. I know it only from the illustration in the Biologia

Centrali-Americana (pl. 103, f. 32), which looks a deal like *Poanes radians* with a fuscous instead of a fulvous ground color, above and below.

#### GONILOBA SINGULARIS Herrich-Schäffer

Herrich-Schäffer, 1865, p. 55; Gundlach, 1881, p. 168; Skinner & Ramsden, 1924, p. 318.

Ramsden, who saw the type of this species, says that it looks very like *Tigasis cornelius*. It has often been placed in the genus *Copacodes*. Gundlach describes the species thus:

"This is also a species peculiar to the island of Cuba. I collected a single specimen, a male, in the jurisdiction of Guantanamo. I know nothing of its larva or habits.

"The specimen is dark brown, with ferrugineous atoms over the body, the base of the forewings and the entire surface of the hindwings. One sees the characteristic brand rough-black and prominent. Beneath the color is very similar to that above, except for the absence of the brand. Expanse, 40 mm.

"Herrich-Schäffer says that the posterior tibiae do not have a hair pencil, and the mid tibiae no row of spines. This indication will serve to place the species generically."

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When a colon is interposed between the species name and the author's name, as *Terias clathea*: Poey, 1846, p. 385, it indicates that

the author did not intend to propose a new name. The citation *Terias palmira* Poey, 1852, p. 198, without the colon, indicates that Poey here proposed the name *palmira* as new. This procedure has seemed necessary in order to distinguish between new names and misdeterminations or misspellings of old names.

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